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SURGICAL MEMOIRS

AND OTHER ESSAYS

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OTHER ESSAYS

BY

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1908

NEW YORK
MOFFAT, YARD & COMPANY
1908

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PUBLISHED, SEPTEMBER, 1908.

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TO MY WIFE

APR 13 1955

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SURGICAL MEMOIRS

NARRATIVE OF SURGERY; A HISTORICAL SKETCH[1]

"Ut transeundi spes non sit, magna tamen est dignitas subsequendi."
—QUINTILIAN.

HIPPOCRATES

470 TO 361 B.C.

HERCULES was the father of Æsculapius, who was the father of Polidarius (one of Homer's heroes), and so on for twelve generations until we come to the first Hippocrates, who was the grandfather of the second Hippocrates, the *Great Hippocrates*, born about 470 B.C. Much of this genealogy is myth, but there is no myth about Hippocrates. He was a man.

Among medical heroes it is the positive, the virile, the real, that appeals to us. Mists and vapors, hypotheses and systems, do not interest the average modern reader; but things accomplished and the final word said, do interest him. So observe this, that deeds done, facts accurately stated, action taken in accordance with what is known, — these things are characteristic of the history of surgery as distinguished from much

[1] Chapter I in Keen's "System of Surgery." Reprinted by kind permission of the W. B. Saunders Company, Philadelphia.

of the history of medicine. Often we cannot divorce the two tales of medicine and surgery, but very often we can; and when this is possible, the tale of surgery and of the surgeon will attract us.

Hippocrates was the Father of Medicine, but he was a surgeon also; Herophilus, after him, was a surgeon; so were Asclepiades and Soranus and Galen and Paul of Ægina, and others of whom the writers tell.

Who was this famous Hippocrates? Where did he live? What were his teachings, and who his professional forebears? What was it he did that he is to be remembered as the father of us all?

Hippocrates was born and lived in stirring times. His native place was the Greek island of Cos, close to the coast of Asia Minor, and in about the latitude of Sparta. In those days the tide of Persian invasion was being rolled back; the Athenians, under Cimon, were reëstablishing Greek supremacy in the Levant, on the eastern shores of the Ægean Sea, and Athens was developing that era of social and intellectual greatness to which we now refer as the Age of Pericles, — an era covered roughly by the sixty years subsequent to the battle of Salamis (480 B.C.).

Hippocrates grew up in an island Athenian in its sympathies and affiliations; and the influence lasted throughout his life. He came of a family of physicians, long trained in a medical practice handed down from father to son; and be it observed that medical practice was not altogether contemptible even before his time. For more than a thousand years the surgery of Egypt had meant something to the world, and the

ancient Egyptian custom of embalming the dead had given its practitioners a little crude knowledge of anatomy. They trephined the skull for migraine and epilepsy, they performed circumcision, they removed superficial tumors, and they set broken bones.

Then there were the Old Testament Jews, who made acquaintance with surgery, an acquaintance acquired from their Egyptian masters. They sutured wounds and passed the uterine sound; they appear to have operated for imperforate anus and are said to have used some feeble anæsthetics. There were dentists among them who inserted false teeth, and there were artificers of wooden legs. Such accomplishments show very practical advances in surgery many centuries before our era.

Egyptian surgeons became famous; they traveled and visited foreign courts and peoples, practicing upon the bodies of Arabians, Persians, Assyrians, and Greeks. Nor were the Greeks themselves idle through all those years. In some sort they were the Yankees of that far-away ancient world. They were travelers, traders, seamen, and scholars, — always restless, eager, inquisitive; seeking new markets, planting colonies, looking for knowledge.

It came about, then, long before Hippocrates was born, while Æsculapius was being deified and Polidarius was quoted still, that much of the Egyptian learning was beginning to find its way to the Greek mainland and to the islands of the sea. Surgeons were esteemed in that Greek country of intelligent men, for the people were warlike, and even in the days

of Homeric heroes there was honor for those who healed the wounded. A little later one learns of Æsculapian families (Asclepiadæ) settled, and of their establishing medical schools, or systems of healing, in various parts of the Greek world; whether or not they were descendants of Æsculapius matters nothing now; but, mark you, these men were physicians and surgeons, not priests; though priests of the temples of Æsculapius did come to occupy an important place in the thoughts of the people.

So the profession of medicine became hereditary in certain families. The practitioners lived together in little communities, to which patients went for treatment. In these communities schools grew up and records were kept; experience accumulated; knowledge was transmitted from generation to generation. The young men were educated carefully and broadly; they were general practitioners as well as specialists; now and again a promising lad was sent abroad to complete his studies. He went to Athens, to Rhodes, to Cyrene, to Cnidos, to Cos; through Syria, Persia, Egypt. He traveled on foot or by ship, studying the peoples and the languages, visiting famous men and famous places. He inspected clinics, he followed special forms of treatment; often he tarried long. Such a man might spend years, or a lifetime even, in acquiring special knowledge or in broadening his general culture. Betimes he was tempted by a handsome offer from some foreign ruler or great man to stay with him and practice. Great surgeons of those days were known to pass their lives in such profes-

sional adventures; in settling and studying and practicing and moving on, consumed always by a restless craving for new knowledge. There must have been a fascination about it, and in those days when your neighbor-city was a month's journey distant, when language changed with every hamlet, when information traveled at a footpace, and news was news still for a decade, one may fancy the delight of moving on and on, leisurely learning things and doing things. The knowledge thus gained was brought back to the home schools, in greater or less amount, and those schools became depots for the learning of the day. So it is probable that before Hippocrates a good part of the surgical acquirements of earlier times had been collected in his family school in Cos. The fifty years preceding his birth were active years with men. There had come a sudden rush of expansion among the Greeks to the west; and the Persians to the east were extending their boundaries and rolling forward to the Mediterranean those vast armies and armadas which the Greeks crushed at Platæa, Salamis, and Mycalé. There was extensive experience of military surgery, and the surgeons of Cos doubtless saw their share. Records of such things, fragmentary, unsystematized, but abundant, were accumulating.

It was into this world and to such a life that Hippocrates was born. He was the prophet needed to give articulate expression to that formless learning, to show the meaning of what other men had seen, and out of his own wide experience to add the master word of

the great teacher. Fain would one know more of his life. We glean scattered fragments from the old writers; there are letters and gossip and tradition, but no connected tale. He grew up and studied his profession in Cos; then he set out on his travels. There is an old lie about his reason for leaving home, — a lie often refuted; his detractors used to say that he owed a great part of his knowledge to the famous library in Cnidos, a promontory of the mainland about twelve miles south of Cos; that after he had extracted from the library all he could, he burned it down so as to balk all future students; and that then he ran away. At any rate, he traveled in many lands, returning at times to his native place for rest and further teaching. How far his wanderings took him does not appear, but mostly he lived and practiced in sundry places on the Greek mainland, as well as in that country latterly called Turkey in Europe; we hear of him in Athens, Delos, Thessaly, and Thrace. During his journeyings he married and had several children. Two sons, Thessalus and Draco, are known to us, and each of them had a son Hippocrates. All were physicians, calling Cos their home. A daughter of our Hippocrates married Polybus, in his turn a celebrated physician. Hippocrates spent many of his best years, youth and age, in Thessaly and Macedonia. Thessaly was his first abiding place after he left home, and he became widely known while living at Larissa there. They tell a story about him in this period: Perdicas was a young king of the neighboring country of Macedonia. For many months he had been thought to have consump-

tion; at last, taking counsel with wise men, he sent to Larissa for Hippocrates to cure him. That shrewd physician quickly convinced himself that the king was a timid lad, hopelessly in love; "Nor in this was he mistaken," as the chronicler says,[1] "for Perdicas, after his father Alexander's death, had become passionately enamored with his father's concubine, Phila; who, when the matter was communicated to her by Hippocrates, so accommodated her behavior toward the king that his health was in a short time completely restored." The later history of this accommodating lady we know not.

Various scattered anecdotes of Hippocrates and other people are told, and he himself writes of many places. Shortly after prescribing for Perdicas he was urged to go to Abdera, on the southern coast of Thrace, to combat the plague. That distemper was then ravaging the northern shores of the Ægean Sea, and distant peoples were clamoring for Hippocrates. It was the Plague of Athens, described centuries later by a brilliant young American.[2] The scourge lasted many years, moving slowly up and down the coast, and Hippocrates fought it here and there. Pericles died of it in 429 B.C., when it raged at Athens, and that year or in later years Hippocrates did what little he could for his beloved Athenians. In such scenes and so occupied he passed his long and active life. Artaxerxes, in distant Persia, heard wonderful tales of the famous Greek, and sent him a great fee to come to his court; but

[1] John Moffat, M.D., "Life of Hippocrates," London, 1788.

[2] E. H. Smith, in *New York Medical Repository*, 1795.

Hippocrates refused to listen. He was growing old then, the devastating Peloponnesian wars were wrecking his Greece, and he seems to have felt that his place was among his own people.

Hippocrates was a contemporary of Socrates, but he was a better practical philosopher. During his life men heaped honors upon him, and after his death they deified him. Among his own Coans even nothing was held too good for him. Indeed, he had helped those brethren of his in many ways which they could appreciate, and they marked him by an initiation in the sacred Eleusinian rites after a manner which no mortal since Hercules had enjoyed. A public entertainment was instituted in honor of him and his posterity.

In his old age, the length of which is disputed, Hippocrates went back to his favorite Thessaly. There he lived until nearly a hundred, — some say he was 109 years old,[1] — and there he died in that Larissa whence he had gone to the rescue of love-sick Perdicas more than half a century before.

The Father of Medicine taught the "humoral theory" of disease; that the body contains four humors — blood, phlegm, yellow bile, and black bile, a right proportion or mixing of which constitutes health; improper proportion or irregular distribution constitutes disease. That is a concise statement of the humoral theory, interesting to surgeons even. Most moderns, when they hear of Hippocrates, recall

[1] The commonly given dates of Hippocrates are 460 to 361 B.C.; but there is no certainty.

vaguely the humoral theory and the "Hippocratic oath." [1]

It is needless here to discuss at large his teachings. The "oath" indicates the dignity and honorable aims of the profession for him. Moreover, he was the first clearly to show that the study of disease must be through observation and deduction. With such tools

[1] This famous fragment of old days is still vibrant as many an ancient liturgy: "I swear by Apollo the physician, and Æsculapius, and Health, and Panacea, and all the gods and goddesses, that, according to my ability and judgment, I will keep this Oath and this stipulation — to reckon him who taught me this Art equally dear to me as my parents, to share my substance with him, and relieve his necessities if required; to look upon his offspring on the same footing as my own brothers, and to teach them this Art, if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and every other mode of instruction, I will impart a knowledge of the Art to my own sons, and those of my teachers, and to disciples bound by a stipulation and oath according to the law of medicine, but to none others. I will follow that system of regimen which, according to my ability and judgment, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous. I will give no deadly medicine to any one if asked, nor suggest any such counsel; and in like manner I will not give to a woman a pessary to produce abortion. With purity and with holiness I will pass my life and practice my Art. I will not cut patients laboring under the stone, but will leave this to be done by men who are practitioners of this work. Into whatever houses I enter, I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption; and further, from the seduction of females or males, of freemen and slaves. Whatever in connection with it, I see or hear, in the life of men, which ought not to be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret. While I continue to keep this Oath unviolated, may it be granted to me to enjoy life and the practice of the Art, respected by all men, in all times! But should I trespass and violate this Oath, may the reverse be my lot!"

as he could command he made his diagnoses and his prognoses. He and his disciples carried the art of prognosis far. Their conclusions were drawn from symptoms, but their rare patience in studying and recording these gave great value to their forecasts. In a word, that was scientific medicine.

One might devote a chapter to the surgery of Hippocrates.[1] He discoursed wisely and elaborately of fractures, of joints, of the structure and diseases of bones, of ulcers, of fistulas, and of hemorrhoids. A great deal that he wrote is sound still, though many of his conclusions do not coincide with those of modern experience; however, it is all much more final to-day than are his purely medical writings. The stamp of truth is on all the genuine Hippocratic work. He reported cases good and bad, and extenuated nothing in the telling. He dwelt also upon the patient's general condition as affected by special lesions; upon fever, delirium, wasting, and the constitutional tendency. He noted especially the breathing, the facial expression, pallor, the body temperature, and the appearance of the urine, feces, and blood. In addition to these elaborate dissertations, his writings deal with trephinings, with the reduction of hernia, with herniotomy, and with lithotomy by both the perineal and the suprapubic routes. He described pneumothorax and opened and drained the chest for empyema and hydrothorax. All these things and many others he did, and he seems to have done them well. The most interesting feature of

[1] In Francis Adams's two-volume edition of the "Genuine Works of Hippocrates" nearly all of the second volume deals with surgery.

his work for us is that he had a clear conception of a great number of surgical lesions, that he described faithfully and graphically what he saw, that he employed rational surgical methods of treatment, and that he taught others what he knew.

This sound work so appealed to men in that ancient world of limited knowledge that they came to regard the steward of a few things as the master of many things. Whatever Hippocrates taught was true in their eyes, and in the changes of idealistic philosophy which followed his era, men continued to cling to those facts which Hippocrates had given them.

GALEN

131 TO 201 A.D.

Nearly five hundred years elapsed between the death of Hippocrates and the birth of Galen — half a millennium; a period equal to that which separates us from the battle of Agincourt and the ancient French surgeon, Guy de Chauliac. Galen revered Hippocrates and followed his teachings and quoted him in his books. Who quotes De Chauliac?

During those five hundred years after Hippocrates the world of politics had moved on, and the map-makers had been at their work. The glory of the Greece of Pericles had departed; Alexander had conquered his world and wept and died; under his lieutenants and successors a Greek Egypt had risen and decayed; Carthage had fallen; the Roman Republic had embraced the world and given place to the Roman Empire; Jerusalem had been destroyed, and Christianity was gathering strength for that sweep of progress which was to increase in proportion as Rome declined.

Surgical science could show no stupendous changes. Plato and Aristotle followed Hippocrates; Plato, the immortal idealist, but without the scientific method, influenced enormously the ancient world of thought; while Aristotle, with a keener appreciation of nature, taught surgeons the value of anatomy and some understanding of the inductive method.

After Hippocrates, our landmark is the Alexandrian School, important more especially because Galen studied there in its declining years. Galen was a Greek. You will observe that most of the famous physicians of the old Roman world were Greeks; the Roman genius failed to appreciate and cultivate medicine. As for Alexandria, its influence on the science of antiquity was enormous. Many teachers and schools arose there, and for nearly a thousand years it was the Mecca of medicine. Herophilus,[1] the great anatomist, taught there. Do we not recall him still in the torcular Herophili?[2] He founded a school, as did his rival Erasistratus. These men and their followers made famous that Greek city in Egypt, where most of the old-world surgeons studied, and about which many of them wrote; Celsus, among others, at the beginning of our era, a scholar and compiler, rather than a practitioner, but often quoted as among the fathers. The one great thing accomplished by the Alexandrians was the study and development of anatomy by dissections. Let us remember them for that one thing if for nothing else, for from the decline of Alexandria to the time of Vesalius — nearly one thousand years — knowledge of anatomy made no advance.

Galen was a product of Alexandria. His is a notable name, and the man was a great man. Certain dyspeptic moderns have felt called upon to sneer at him because he knew less than we know; but let us

[1] A Greek of Chalcedon, born about 300 B.C.

[2] *Torcular*, "wine press."

remember that the second century was not the twentieth century, and that according to his lights Galen did a very great work. None but a great man could have controlled medical thought for nearly sixteen hundred years. He was a surgeon as well as a physician and a philosopher.

Claudius Galen was born in the year 131 A.D. He was an Asiatic Greek, and his native town was Pergamus, on the Caicus River, in southern Mysia. So he was almost a fellow-countryman of Hippocrates, for Pergamus was on the mainland, 155 miles due north of Cos. Galen was a handsome, vigorous, precocious boy, the son of a high-bred, cultivated, and wealthy father, Nicon, a professional architect, who devoted himself to the education of his promising son. The son passed his life among conspicuous scenes and notable men. He was extraordinarily able, steeped in Greek culture, and intolerant of humbugs and fools; not a comfortable man to live with, if one may judge from his own writings, for he was conceited and short-tempered — a very different person from the steady, kindly, great-hearted Hippocrates; but his lines were laid in difficult times, and he scorned his superficial, cynical, flabby-minded professional colleagues of Rome, where his most productive years were spent. The history of Galen and his times is intensely interesting. To the twentieth-century reader none of the ancient physicians seems so modern, so vital, so human. His accomplished father destined him for a scientific career and had him carefully educated. He studied in the best schools; he was a pupil of the

Stoics, the Academies, the Peripatetics, the Epicureans — and he was a faithful pupil. Though not robust in youth, he was active and well trained; his mind was acute, his memory retentive, his understanding just. Men would call him a genius, had not he succeeded the great master Hippocrates. Among his preceptors Galen mentions eight men — names merely, rescued from oblivion. Writers tell us that he was an accomplished physician at the age of eighteen, and that at twenty-one he had composed some medical works. In these days we accept with caution those tales of precocity. However, such learning and such giving forth seem to have been of the schools and not of experience, for Galen appreciated then, as he appreciated through life, that contact with the patient and with the organs of the body is essential. Then as now, too, the actual difference in knowledge of highly trained men was negligible. Distinction consists in exploiting knowledge and making it available.

At the age of twenty-one Galen lost his father. Then the wandering spirit seized him and he began his travels. The experience was such as our best cultivated men know to-day. He went for a time to Smyrna and Corinth for the lectures, then to Alexandria. He had an enormous ambition and a boundless curiosity. He devoured and digested all sorts of information. He worked hard for years over anatomy and physiology; he followed eagerly branches of pure science; he became accomplished in letters and the arts. After a year or more in Alexandria he pushed on, observing, comparing, noting, — through Cilicia,

Palestine, Italy, Thrace, Macedon, Crete, Cyprus. He visited Lemnos; he traveled in Syria. Like a proper peripatetic, he went on foot, seeing things and remembering them afterward. Finally, in his twenty-eighth year, he went home to Pergamus and settled down to teach, write, and practice. After four years of such provincial life the magnetism of the capital of the world became too strong for him. Making an excuse of sundry civil disturbances and tumults in Pergamus, he set forth again and went to establish himself in Rome.

From his first going to Rome, through the rest of his life, Galen found little peace. He was a strong, outspoken character, always uncompromising, and he made enemies. The profession in Rome was debased. Science had almost ceased to exist there. Commercialism and quackery ruled; the Oath of Hippocrates was a dead letter. A careful writer recently has described the "Medicine and Doctors" of Juvenal.[1] Now, Juvenal belonged to the generation of Galen's grandfather, but the times had changed little, and for the worse. We must believe the great satirist, beside whose pictures those of Tolstoy pale, when he says that Rome was a vast den of thieves; that life there was intolerable; that decency was almost unknown; that the decalogue was shattered daily in every household; that the doctors were a parcel of vampires, mean-spirited, dishonored, ignorant, — preying upon their patients as upon each other; poisoners, procurers,

[1] Eugene F. Cordell, M.D., in *Medical Library and Historical Journal*, vol. 8.

extortioners. Indeed, that Rome was a sorry place for an honest man of science.

Galen seems to have thought at first that he could bring some decency out of the mire, some return to the spirit of science, but he came bitterly to comprehend the futility of such a hope. The men on the ground had the ear of the degenerate public, and, except among the more intelligent and the powerful as well as among the virtuous few, he found little favor. Fortunately for him, the intelligent and the powerful were more numerous than were the virtuous few, so that he secured work and eminent patrons. Among such distinguished persons he names Eudemus, a peripatetic philosopher; Sergius, prætor at Rome; Barbarus, uncle to the Emperor Lucius Verus; and Severus, the consul, afterward emperor.

Galen lived and practiced in the midst of such people for five years; then in disgust he went home for a short time to Pergamus, but was soon recalled to Italy by the emperor, to attend him and to combat the plague. He was then about thirty-five years old, and from that time until the end of his life he worked on in degenerate Italy — a scientist striving not to be a courtier. It is not clear what sort of success he made of these strivings. Marcus Aurelius wanted to take him as his personal surgeon to the war in Germany, but Galen escaped that service and remained with the court in Rome. There are sundry tales of his cures, — tales told mostly by himself, but he has something to say of his failures also. An American writer [1]

[1] David Hunt, *Boston Medical and Surgical Journal*, vol. cxxxi, 1898.

dismisses him casually with the statement, "Perhaps the worst to be said of him is that he assisted in preserving the health of Commodus [son of the emperor], and the best, that he maintained much the same position in medicine as that occupied by Marcus Aurelius in philosophy." Fanciful as is such a comparison, it is certain that both men impressed themselves upon human thought for centuries: Galen growing dim in recent times — an authority no longer; Marcus Aurelius, the emperor philosopher, looming larger through the years.

So far as Galen's life is known to us, however, and long as that life was, there is little more to say of it. He went on with his working and writing; he continued to cultivate the hatred of his colleagues; and he enjoyed to the end the confidence of powerful friends. The exact date and place of his death are not clear. Probably he died in Rome in the year 201 A.D., when he was nearly seventy years of age. However, the surgical achievements of the man must engage us now, and some attempt to explain what it was he did, and why it is that he remains the second great medical prophet of antiquity.

The fundamental reason for Galen's great and sustained reputation is his constant employment of demonstration and his reliance on rational and intelligible evidence. In a broad sense he was a faithful disciple of Hippocrates, for he followed the great master in practicing and teaching the essential importance of the study of vital phenomena. Hippocrates confined himself to bedside investigation. Galen went farther; he

practiced and taught laboratory methods through animal experimentation. He was truly our first great physiologist. Mark some of his writings and their bearing upon surgery as a therapeutic agent, remembering at the same time that surgery and medicine had not then suffered that artificial divorce which so crippled scientific progress in the Middle Ages, and to no small extent does still cripple it. Galen appreciated, as did those other ancients, that physiology is physiology, that diagnosis is diagnosis, and therapeutics, therapeutics, with surgery a branch of therapeutics.

Perhaps his most famous discovery, and the one for which he is best known, is that of the true function of the arteries. Previously, arteries had been held to contain air, as their name implies. He recognized that arteries in the dead appear to be empty or to contain air, but he demonstrated by the double ligature of an artery on a living animal, and subsequent section of the vessel between the ligatures, that the artery is distended with blood. He observed, too, that arterial blood differs from venous blood, and this phenomenon he ascribed to the entrance of some vital element of the atmosphere through the lungs into the arterial system.

More remarkable still, he asserted a fact which even Harvey fifteen centuries later did not observe,—that there is a terminal communication between the two sets of vessels, veins and arteries; and he used our present word *anastomosis:* "The arteries and veins anastomose with each other throughout the whole body, and exchange with each other blood and spirits

by certain invisible and exceedingly minute passages." [1]

Galen studied the heart also and described its movements in a fashion not unworthy of Harvey. He wrote: "We can also see the arrangement and action of the fibers of the heart under two conditions, either by examining the organ when just taken out of the animal and still pulsating, or by removing the sternum in the manner which I have described." [2] And let anatomists note that fourteen hundred years before Botali he described the foramen ovale and the ductus arteriosus. He described them as physiologically associated, and as belonging to the fetal condition.

Of supreme interest to surgeons is the fact that Galen knew and practiced the ligature of arteries; though it does not appear that he applied the principle to vessels severed in amputations — a principle the establishment of which immortalized our sixteenth-century Paré. In his treatise on tumors Galen describes aneurisms, true and false, and recommends compression for their cure. He preceded Antyllus, whose famous operation for aneurism is still taught in our schools. Antyllus wrote toward the end of the third century, and our knowledge of him comes to us through the encyclopedic Oribasius, physician to the Emperor Julian (361 to 363). Certain it is, therefore, that the daring operation of double ligature and incision was unknown to many-sided Galen.

The nervous system was Galen's favorite field of investigation. He regarded the brain as the central

[1] "De Usu Partium," vii, 10. [2] Ibid., vi, 8.

organ from which the spinal cord is an offshoot, and recognized that the nerves are structures designed to convey impressions of sensation and motion. He taught that "the muscle is the instrument of voluntary motion; and we have seen whence the principle of this motion originates, and by what path it travels. It comes *from* the brain and *through* the nerves."

The functions of the cord, too, received his elaborate consideration, and to all of his statements he brought experimentation for proof.[1]

He advocated, accordingly, sundry operations for injuries to the brain and cord, and he advocated them intelligently. Others among the ancients were familiar with such procedures, but much of Galen's writing has a curiously modern sound. He used the trephine on the head less than did others of his time, for he preferred the gouge and chisel. In injuries to the spine with compression of the cord he appreciated the condition, made a proper diagnosis, and advised an operation for relief.

Briefly recorded, such are some of the achievements of this remarkable man. Doubtless many of his views were erroneous and his advice unsound. He was a voluminous writer, who felt that his mission was to instruct the profession in every branch of medicine. Often he was visionary; often, for lack of the microscope and of a knowledge of chemistry, his assertions were mere guesswork and his hypotheses untenable; but, with such light as he had, his methods and

[1] Vide "De Hippocratis et Platonis Placitis," vii, 8; "De Administrationibus Anatomicis," vii, 9, 10; "De Locis Affectis," iii, 14.

purposes were correct. If he had lived in more settled times and among a people sensible of the meaning of science as he taught it, there can be no doubt that the impetus he gave to medicine would have broadened into great schools of learning such as the world had to wait for during nearly eighteen centuries. With his death and the passing of his immediate successors progress languished and expired, for the ancient world was dying and was bearing down with it the humaner arts.

The significance of all this belongs to the domain of world-history rather than to this simple narrative; but the course of world-history bears immediately upon our theme. That corrupt, besotted, old civilization must needs have been destroyed. The rough, wild, clean-bodied barbarians had to be turned loose for centuries over the earth to sweep it clean, else had mankind expired of very rottenness. For generations it seemed that the Church alone had survived — that wonderful Church, adored, feared, reviled, misjudged, and misjudging. Now a sink of superstition and cruelty and folly; again the stanch, unterrified, unbroken guardian of shattered civilization; cherishing, ignorantly often, but jealously and fiercely, the records of a past science. It is the fashion of writers bitterly to accuse the Church of standing doggedly across the path of knowledge and persecuting the disciples of truth; and doubtless the charge is a thousand times just, but we must remember also that what little Western learning survived through the dark ages was stored and guarded in monastic vaults and clerical

libraries — wealth unrevealed and unknown even to the custodians, but still in some fashion preserved for the enlightenment of wiser generations.

Briefly, then, what have we seen to be the course of medical science? Among the Greeks medicine held a high place, for the Greek genius was most conspicuous in the affairs of civil life and the realm of intellect. Among the Romans, military affairs were regarded as most worthy the attention, and this worship of physical force stunted eventually intellectual growth and pursuits. After the republic, the rise of a military aristocracy accentuated still more this tendency, and made permanent the inferior position of the learned professions, especially of medicine. During nearly two thousand years this Roman influence maintained, for even after the rise to power of the Church of Rome the soldier continued to be regarded as the superior of the priest. First the soldier; second the priest; third the lawyer; fourth the merchant; fifth the physician; and then after a long interval the surgeon, ranking with the humblest of craftsmen.

VESALIUS

1514 TO 1563

Andreas Vesalius was born on the last day of December, 1514 — nearly thirteen hundred and fourteen years after the death of Galen. Imagination is staggered by the attempt to grasp in detail that mighty span of centuries; yet the meanest imagination among us could measure with a foot-rule the intervening progress in science. Galen's works were text-books still. Names are named in the interval, and a few good surgical writers, — Antyllus and Oribasius already noted, Ætius Amidenus, Alexander of Tralles, Paul of Ægina, — all belonging to the old order. Then there were the Arabians, Avicenna (980–1037 A.D.) and Albucasis (died about 1105 A.D.).

Those Arabians are worth noting as we pass. Medical science must generally be looked for at its best among forward and active peoples, and during the Middle Ages the Arabs were conspicuous in the world's history. Both Avicenna and Albucasis were authorities for centuries, — not so much for any new thing they did as for their compiling and bringing before the medical public, such as it was, the best ancient teaching, otherwise lost or forgotten. In a way they were necessary to Vesalius.

Vesalius is a landmark in our course because he did

new and important things. He cast aside tradition and saw with his own eyes. Men say that he overthrew Galen; but in truth he was the follower of Galen in science — the first man known to me, for thirteen centuries, to adopt and practice the methods of that ancient master. He improved on Galen, he corrected many of Galen's errors, he came to be a man full of novel lore; but why disparage Galen? Do not we twentieth-century students know things undreamed of by Hunter, Rush, or Drake? Vesalius is not generally reckoned among the surgeons; indeed, surgical writers pass him by and tell rather of his contemporary, Ambroise Paré, of whom we shall hear; but to-day Vesalius would properly be regarded as a surgeon. He held a chair of surgery; he was a profound student, the founder of modern anatomic research, the man who made possible for us a development of surgical science.

Fain would one dwell upon those wonderful years of the sixteenth century, when Vesalius lived and taught. We are wont to sum it all up in the word *renaissance*. That was the springtime of our world. Great names crowd the text — Luther, Michaelangelo, Raphael, Titian, Copernicus, Columbus, to go no farther. Men were breaking away from tradition, the dark veil of the Middle Ages had been rent. In the midst of such stirrings Constantinople fell before the militant Turk, and wise men fled from the ancient capital, bearing with them, for their Western brethren, forgotten treasures of Greek literature and science.

The story of Vesalius's life is far different from that

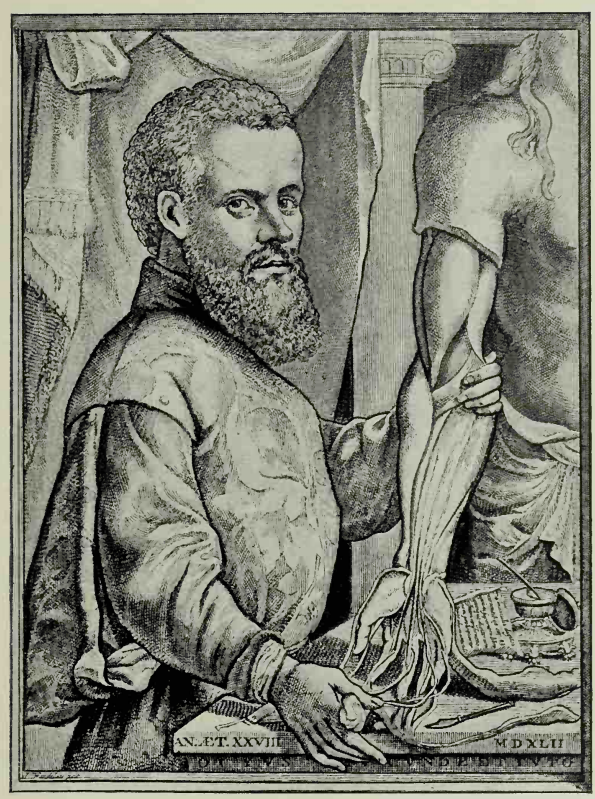
of the rude craftsmen who composed the surgical guild of his day. He was a cultivated product of the great universities, with learning as well as genius, and he came to appreciate early the importance of anatomy and its bearing upon surgery.[1] He was born in Brussels of an excellent burgher family, established for generations at Nymwegen. His traditions were of the best, for he came from a line of physicians and learned men. His father was apothecary to Charles V. Like Hippocrates and Galen, Vesalius was carefully educated, and he spent many of his youthful years at the famous old University of Louvain, not far from home. Alas, for our lack of space! that old university life is a subject worthy of study.

The lad was born with a passion for dissecting. At Louvain he had to be satisfied with animals. Then, at eighteen, in 1533, he went to Paris to learn of Sylvius (Du Bois) — that Jacobus Sylvius after whom the fissure is named.

Sylvius was no surgeon, he was not even a great anatomist. He was a lecturer who read out of Galen to his pupils sitting about, with an occasional dead body before them. Now and then, by direction of the master, the crude barber assistants exposed roughly some structures for the gaze of the audience.

This was futile work. Stories are told of Vesalius's impatience; one of them that at the third demonstration, exasperated by the ignorance displayed, he thrust aside the stupid assistants and showed with his own

[1] "Vesalius: His Forerunners and Followers," Lecture I, in "The History of Physiology," by Sir Michael Foster, 1901.



Andreas Vesalius

hand how the dissection should be done. That anecdote is the key to the man's life. Anatomic research, applied anatomy, physiologic deductions from such tasks, surgery, and general practice were to be his work, but always he turned back with almost fierce joy to anatomy and surgery. He spent three years of study in Paris; then another year in Louvain, where he issued his first publication, — a translation of the ninth book of the Persian Rhazes, — and then he went to Italy, where his masterpiece was to be accomplished. It is interesting to note that while a lad in Venice he probably knew the young monk Ignatius Loyola, founder of the Order of Jesus.

The abilities of Vesalius must have been brilliant and conspicuous, for almost at once he attracted the attention of leading men in Venice. He was granted the M.D. of Padua in the same year, 1537, and soon afterward, when but twenty-two years old, was given the chair of surgery and anatomy in that university.

Opportunity for anatomic study was greater then in Padua than anywhere else in Europe. The authorities were nursing the university, and the restraining hands of the Church were held off. For five years Vesalius worked there with enormous success. He was instantly popular as a teacher; he was an inspiration to thousands of students. He told them what he knew, and, most important of all, he taught them the scientific method. He killed and buried the old system of authority in anatomy. Though the edifice of speculative medicine survived for many years, he weakened its foundations.

In 1543, the sixth year of Vesalius's life at Padua, he published the "Fabrica Humani Corporis." Promptly the heavens were opened, and the wrath of intrenched conservatism descended upon him. Just before his book appeared he had left Padua for a time, with the consent of the Senate, and it was during this absence that the storm raged. His old master Sylvius and others thundered against him for daring to point out that Galen was wrong. He returned to Padua after a year, but found that even there opposition to him was strong. He gave a few lectures in Padua, Bologna, and Pisa, demonstrating again on the cadaver the truth of those things he had published, but at last, wearied of persecution and contemptuous of his weak-kneed world, he gave up his career and accepted the post of court physician to Charles V.

There is little more to tell. Vesalius continued in the service of his patron. Twelve years later, on the abdication of the emperor, he was transferred to Philip II. He chafed against the life; now and again he attempted to break away. Then, in 1563, he started out on a pilgrimage to Jerusalem. He visited Venice. He renewed former friendships. We can believe that he may have intended, on his return from the East, to continue the pursuit of science as of old; but fate overtook him. He did not live to see his Padua again; he was taken ill on the voyage home, was landed on the island of Zante, and there died in his fiftieth year.

AMBROISE PARÉ

1510 TO 1590

We hear a deal of talk about "barber-surgeons" and "surgeons of the long robe" — to our confusion often. Ambroise Paré was a surgeon of both sorts. Let us get clearly in mind the distinction, learn something about the status of surgery in those centuries, and then hear something of the life of that famous man.

We know how in Paré's time the Church had controlled all European learning for years, save for what the Arabians taught to a few daring and ambitious travelers. In the days of the Fathers and in the Middle Ages, healing was one of the priest's functions. But the shedding of blood was abhorrent to holy men, so they dealt with internal medicine only — in feeble and superstitious fashion, though they had some skill in the treatment of wounds. In such tasks good women, too, had their share; but surgery — the actual shedding of blood — was left to the Jews and to the profane and vulgar. Now, in the dark ages it came about that tonsures necessitated the presence of barbers in the monasteries; besides the tonsure, regular bleedings were prescribed for certain orders. The much-quoted Gardner [1] tells us that both duties — shaving the heads

[1] John Gardner, "Sketch of the Early History of the Medical Profession in Edinburgh," Edinburgh, 1864.

and bleeding — fell naturally to the same officer, and there we see the origin of barber-surgeons.

This combination of functions flourished in France. The common barber there was a despicable creature, and the barber-surgeon, too, was contemptible. In Italy, with its greater enlightenment and higher standards of education, the same odium did not attach to the barber-surgeon's office. French customs ruled in northern Europe, however, and the surgeons of England and Germany ranked with their Gallic brethren. So let us observe the situation as it developed in Paré's France.

Long before his time there had grown up a class of regular *physicians* — men educated in a fashion, compelled to know and speak Latin, licensed to practice. They were the great men of the profession, the men at the top, as the barber-surgeons were the men at the bottom. Between the top and the bottom was a third body of practitioners, surgeons proper, who came to be known in France as the confraternity of St. Cosmo or St. Côme. These were the "surgeons of the long robe," while the barber-surgeons were "surgeons of the short robe." The three sets of men — physicians, surgeons, barber-surgeons — were for long in conflict, as was inevitable. The short robes poached on the preserves of the long robes; that is to say, they went out of their sphere as bleeders and minor operators, and undertook serious major operations. The long robes, who were better educated men, presumably learned in the great writers, and speaking Latin, attempted constantly, by prescription and legal means,

to put down these upstarts. At the same time the long robes offended the physicians by giving drugs and undertaking general practice. So the long robes were at feud with the men above them and with the men below them.

We need not follow in detail their endless wrangles. Until modern times the physicians maintained their position of superior equipment and authority, but there was constantly a gradual leveling up of the two inferior orders, until, in the eighteenth century, a broader and more scientific basis for surgery was established. Finally, in Paris the confraternity of St. Cosmo gave way to the Academy of Surgery in 1731, with the great Petit as director, and still later there was added to this the École Pratique de Chirurgie, with Chopart and Desault among its professors.

Ambroise Paré began life as a humble barber-surgeon, and ended as the greatest surgical authority in Europe, and the best beloved man in France. He was not trained in the schools; he was not a great scientist as was Vesalius. He was a practical clinician, who went through the world with his eyes open, and brought to bear upon his task hard common sense, impatience of vapid tradition, and an enormous experience.

Paré was born in 1510 in the village of Bourg-Hersent, now part of Laval, in Maine. His father was a servant, possibly a valet and barber; his brother Jehan and his brother-in-law Gaspard Martin, were barber-surgeons. We have a great deal of light on the training and career of Paré. The student of those times may read the volumes of Malgaigne or the

"Life" by Paget. Paré was apprenticed early to a barber-surgeon, and then, in 1533, at the age of twenty-three, he went to Paris, where the plague was raging and work was to be done. Louis XII had died in 1515, and Francis I was king. Paré was destined to see Henry II, Francis II, Charles IX, Henry III, and Henry IV.

Almost at once the young surgeon was appointed a resident in the Hôtel Dieu, that famous hospital then already nine hundred years old, and there he served as pupil, dresser, and operator for three years. Vesalius, who was four years Paré's junior, had just left the place, but they served the same masters and heard the same lectures, for Sylvius taught them both. They were to meet at last after many years — for there is reason to believe they consulted over the deathbed of Henry II in 1559.

Paré's three years of service in the hospital laid the foundation for his remarkable and romantic career.[1] On leaving the Hôtel Dieu in 1537 he does not appear to have taken with him any special license save his acknowledged ability and a sanguine enthusiasm. He craved more experience, and he looked for a permanent abiding place. So he went to the war in Piedmont, but first made an establishment in Paris. In that way, as Paget says, the two streams of his life flowed on side by side for many years. He was with the army in time of war; he practiced in Paris during the intervals of peace.

[1] For a delightful account of "Ambroise Paré and His Times," I refer the reader to Stephen Paget's book. G. P. Putnam's Sons, 1899.

AMBROISE PARÉ

When Paré was old, there was a man living in Paris to whom we owe a great deal. He was one Etienne Gourmelen, Dean of the Faculty of Medicine, and he was a wrong-headed person. In 1580 he published a book, and in his book he attacked Paré. This drew from Paré his famous "Journeys in Diverse Places" (1537–1569), without which our surgical literature would be the poorer. The "Journeys" tells the surgical history of Paré's life, and the wretched Gourmelen is flayed incidentally.

You must take for granted the charm of Paré's tale. A brief outline of it is this, that in 1537 he went off to the wars as an independent surgeon with one Colonel Montejan. In those days there was no organized army medical service. Paré picked up his work and experiences where and as he could. He attached himself to one great man or another for many years, until, in 1552, the king appointed him one of his surgeons-in-ordinary. In 1541, when thirty-one years old, he had qualified as a master barber-surgeon.

There was no regular salary for such services as Paré gave, but fees were manifold and often eccentric. We read that at one time he received a cask of wine, at other times fifty double ducats and a horse, a diamond, a collection of crowns and half-crowns from the ranks, other "honorable presents and of great value"; from the king himself, three hundred crowns; another diamond, this time from the finger of a duchess; and a soldier once offered to him a bag of gold.

Men showered gifts upon him, and the army always loved him. His presence alone came to be regarded

as equivalent to ten thousand reënforcements. He was the intimate friend of generals and the idol of their troops. He was sane, humane, resourceful; abounding in common sense, in shrewdness, in natural ability. He weighed and winnowed authority; he dared to have original opinions. He loved the people, but he did not hate their rulers; he was loyal, quiet, conservative; Paget says that "he was a man who heartily disliked change, self-will, skepticism, controversy, politics, and foreigners." Paré's personality counted greatly. It was so with him as with Boerhaave, and Charles Lamb, and other great ones we know; but he did things, too, for which we must remember him. He made important discoveries, and he wrote about them. His publications number eleven and treat of an enormous variety of subjects, professional and extraprofessional.

Paré dealt rationally with gunshot wounds, showing that they are not necessarily poisoned and that cleanliness and support often suffice for their cure. He wrote elaborate treatises on anatomy and surgery; a special monograph on head injuries, and on the plague, smallpox, measles, and leprosy. Those were some of his strictly professional writings, and then there was that account of army adventures and military surgery in his "Journeys." He was an eager and vigorous writer, with the story-teller's instinct and a sure sense of proportion. He makes his points firmly and boldly, leaving one ready to hear more. He was as original in his writing as in his practice. He was the first of our great modern clinical surgeons, just as Vesalius was the first of our modern scientists. He made careful

and exhaustive diagnoses; he spared the knife so far as possible; he was dexterous and nimble, but never slovenly. He was especially skilled in the dressing of wounds, and prided himself on making his patients comfortable. His bandaging was a work of art, for he insisted that the rollers should be neatly and accurately made, and he applied them himself smoothly and deftly.

Paré is known to most of us for two great improvements in our art—a simple treatment for wounds, and the use of the ligature in amputations. Space does not permit me to elaborate these two matters; suffice it that he came upon a let-alone treatment of wounds, at Turin, in his first campaign. Old custom prescribed that wounds, and gunshot wounds especially, should be treated with boiling oil — an agony to the patient and the cause of delayed healing. At first Paré used this method fearfully, but after one severe engagement his oil gave out, and he had to content himself with an extemporized simple ointment. To his surprise and joy he found the next day that his patients thus treated had fared better than the others. Former men had seen the same thing, but he had the genius to take to heart what he saw, and ever afterward, against bitter opposition, he taught the humane treatment.

Paré's use of the ligature for arteries instead of the old cautery came about in a somewhat similar fashion. In 1552 he was with the army besieging Danvilliers: "There was a culverin shot passed through the tent of M. de Rohan, which hit a gentleman's leg, which was of his household. I had to finish the cutting off of

it, which I did without applying the hot irons." He used the ligature, and was delighted with the result of his experiment. We know how Galen had ligatured vessels wounded in continuity, but it is to Paré that we owe the end ligature in amputation stumps. Such teaching was revolutionary; it brought upon him the wrath of conservatives, and to the outpouring of such wrath by the foolish Gourmelen we owe such tales as that of M. de Rohan's unfortunate gentleman.

Paré's life was adventurous and brilliantly useful to the last. He was always in the public eye; he saw constant service. In the field it is a story of battle, murder, and sudden death;- in Paris it is a record of plague, pestilence, and famine. The end came in December, 1590, when he was eighty years old. He had escaped the St. Bartholomew massacre, he had lived through the wars of the Huguenots, and he died the year of the battle of Ivry, of the siege of Paris, and the final triumph of the house of Bourbon.

ALBRECHT VON HALLER

1708 TO 1777

Ambroise Paré wrote, in his dedication to the king of his edition of 1575: "God is my witness, and men are not ignorant of it, that I have labored more than forty years to throw light on the art of surgery and bring it to perfection. And in this labor I have striven so hard to attain my end, that the ancients have naught wherein to excel us, save the discovery of first principles; and posterity will not be able to surpass us (be it said without malice of offense) save by some additions, such as are easily made to things already discovered."

Now, this amazing statement proved fairly sound. In the *art* of surgery after Paré there was no great or radical progress for many generations; indeed, the art of Paré would not have been unworthy the art of Wiseman, of Petit, of Sabatier, of Hunter, or of Cooper even, for not until two hundred and fifty-six years after Paré's death was anæsthesia made certain to a waiting world; anæsthesia, to be followed by Lister's asepsis and the art of modern surgery.

But between Paré and Lister the *science* of surgery did not stand still, for the science of surgery is but one expression of the noble science of medicine.

During those vital centuries anatomy was revised,

histology and chemistry were born, and physiology was reborn; the great science of pathology itself came to be intelligently studied; embryology was developed, and the uses of the microscope were made known, in a limited way, to laborers in all these fields. If this were a history of medical science as a whole, volumes might be written on what was doing during those centuries, but our task is to note merely some of the benefits which that developing science brought to surgery, and to name a few names. The work of Borelli, Malpighi, Paracelsus, Van Helmont, and Harvey concerns us. Borelli was a physicist and physiologist, who worked out the uses of the muscles. Malpighi, one of the greatest of physicians, demonstrated the anatomy of the liver, the kidneys, the lungs, the nerves, and the skin. He saw the red blood corpuscles, and he discovered the capillary circulation. Paracelsus burned Galen, threw away traditional therapeutics, and pointed the road to modern chemistry. Van Helmont elaborated the crude teachings of Paracelsus, while the great Harvey, surgeon as well as physician, capped the work of the Continental investigators by his demonstration of the proper functions of the heart and of the circulation of the blood. In such breathless fashion we must brush past great names and events until we come to another milestone on our road — Haller, of Bern and Göttingen. He was a professor of surgery and a physiologist, a teacher rather than a practitioner, but surgeons properly may claim him as their own. As Foster says:[1] "When we

[1] "History of Physiology," page 207, by Sir Michael Foster.

turn from any of the preceding writers on physiology and open the pages of Haller's 'Elementa,' we feel that we have passed into modern times."

Albrecht von Haller was born at Bern of a good Swiss family on October 16, 1708; and having done sundry notable things in various parts of the world, he died in Bern in 1777.

It was a marvelous mind, colossal, wide-grasping, omnivorous, retentive, belonging to a domain wider than surgery; but surgical problems occupied some portion of the man's life.

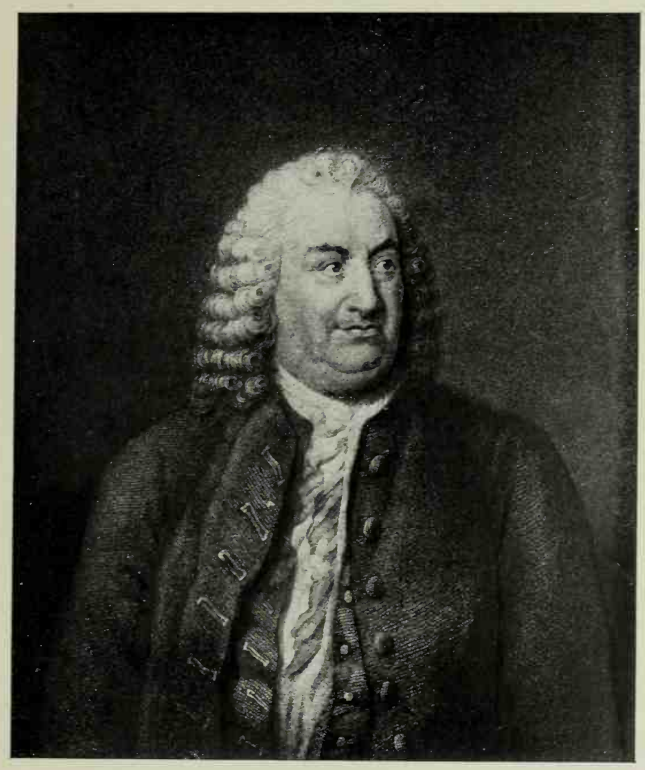
A word about his life: As a child he was sickly and precocious. He mastered strange tongues and was little regarded by his seniors. When less than ten years old he wrote a Chaldee grammar, a Greek and Hebrew vocabulary, Latin verses, and numerous biographies. While still a youth he wrote translations of Horace, Ovid, and Virgil, and an epic poem of 4000 lines on the origin of the Swiss Confederation. He was no prig, and people seem to have loved him even when they could not understand him. But he was little given to sports, and the young men, his comrades, saw in him a paragon rather than a playmate.

When thirteen years old Haller lost his father, and then for a time he went to Bienne, where he studied science and philosophy. After two years there he went to Tübingen for a year, and then, at the age of seventeen, to Leyden, where he began his formal medical studies. Albinus the younger was teaching anatomy there in that year of 1725, and Boerhaave was drawing from all parts of Europe and from America those great classes

which have helped to render him immortal. Immortal he is in some fashion, and in spite of sneers. He was a tireless collector and an inspiring teacher, and in such teaching Haller found his opportunity.

At eighteen Haller finished with distinction the prescribed course of medical studies, and passed the following year as a graduate student in London, Paris, and Basle; of such wanderings and studies there is no time to speak, but they were fruitful even to the youth not yet twenty. The chroniclers tell next of his return to Bern to become a practicing physician. There he worked for six years. He was not a success as a practitioner. The people of Bern were not used to that style of man and shrank from calling him in. But he studied. Ye gods, how he studied! He seems to have devoured the whole known range of medical authors. He read day and night — at his meals, at the bedside, on foot and on horseback, in his travels and at home. He read, and he remembered what he read. He investigated, too. He explored those wonderful mountains among which he was born, and he came to know his Switzerland as no other man has known it. Besides medicine, he devoted himself to botany, and produced a great work on the Alpine flora. He was a poet.

Still he was without honor in his beloved fatherland. But other people honored him. The scientific world was looking toward him, was reading his books on anatomy, physiology, and botany, and his poems too. In those years men were establishing a new university at Göttingen, in the domain of that sturdy George II



Albrecht Von Haller

who ruled England also; and casting about for professors in 1736, they called to them the young doctor of Bern. Haller went gladly, because he hungered for peace and for escape from Philistia. He went to Göttingen, to the chair of medicine, anatomy, surgery, and botany — to a mighty task. For seventeen years in Göttingen his labors were unceasing. He executed faithfully the enormous duties of his office; he stimulated students as none but Boerhaave had stimulated them for centuries. Against modern teachers of science the reproach has been made that they are professional teachers and amateur scientists. One could bring no such reproach against Haller. He knew most things that had been written of ancient science, and winnowed the chaff. But, more than almost any other man who has shared our labors, he possessed that rare type of mind which adds to knowledge. He told men what he had discovered. He excelled as student, investigator, teacher; and during those years the university became famous through all lands.

He went to Göttingen at twenty-eight, and he left it at forty-five. Scientists deplored his leaving, and the great ones of the earth tried vainly to hold him back. He had been ennobled and courted by kings, and had sat in the seats of the mighty; but his was a homespun soul, quickly wearied by names and dignitaries. He threw over all, even the beloved society of scholars, and went back once more to his Switzerland. There he persisted in mighty works for twenty years — almost to the day of his death.

Of what sort, then, were those works? How does

he touch us surgeons, and why do we claim him? Let a few halting words suffice as answer.

Most important of all, perhaps, he lectured on surgery for seventeen years. Two generations of students heard him. Fain would one have known that privilege. And he published two volumes, "Bibliotheca Chirurgica" (Bern, 1774–1775)—a great work dealing with the literature and history of surgery. Its like is to be found nowhere else. So he grouped together the accomplishments of the past and made them available for modern men. Those volumes alone rank him among the most valuable contributors to surgical science, and that though he was no craftsman and never operated, so far as we can learn. More important for us, however, than those great volumes was his teaching surgeons how to study, and his raising the profession from the degraded place in which popular opinion was holding it. In much of that he resembled and anticipated John Hunter. Haller grasped the wide significance of surgery and showed that it is far more than a mere craft. He brought to bear upon it a profound knowledge of anatomy, a keen-eyed devotion to physiology, and an enthusiasm for pathologic anatomy. He showed the absurdity of the mediæval custom which had divorced surgery from medicine and a liberal education, depriving it of the services of distinguished men and cultivated minds. By his example he did more even than by his preaching; he became a great experimental physiologist; through such endeavors he made possible the practical investigation of natural processes, and through such investigations

it has come about that numberless procedures of to-day are feasible and life-saving. His researches on the mechanics of respiration were striking and important; he studied and explained the formation of bone, and he developed the science of embryology. Most important of all, perhaps, he established the doctrine of muscular irritability. Says Foster: "Conspicuous is the absence from his writings of loose expressions and ill-defined general views such as abound in so many of his predecessors. We may take any part of his great work as a trustworthy account of the knowledge of the time with regard to the questions therein treated." [1]

The problems of digestion also received his attention, and the modern surgeon who operates upon the bile passages, the stomach, the pancreas, and the intestines may read with profit and pleasure what Haller has to say regarding the functions of those organs. He lived before the development of organic chemistry, but in treating of the pancreas he says: "A part, at least, of the usefulness of the pancreatic juice will be to dilute and soften the cystic juice . . . so that this mixes better with the food. Whence you may explain the hunger of the animals from which the pancreas has been removed, attributing it to the reflux of a slacker bile into the stomach;" and he ends: "There may be other functions of the liquid not as yet well known to us," prophetic of the work of Claude Bernard, a hundred years later.

We need not consider here Haller's elaborate work on the central nervous system, his almost modern con-

[1] "History of Physiology," page 207, by Sir Michael Foster.

ception of the functions of the brain and the purposes and uses of the nerves. Much of it was blind work, groping work, if you choose, for he had to build up his hypotheses from experiments made with difficulty and often ineffectively, lacking our elaborate laboratories and our instruments of precision. We have indeed gone forward in a thousand ways, but we must look back to Haller as one of the greatest of the Fathers, and admit that recent progress is due to the fact of our having worked upon his lines.

Such, in broken outline, is a sketch of Haller's great labors, and in such labors he continued nearly to the end of his life. In youth and early manhood at Göttingen he studied and taught and stored, giving forth here and there as special interests and occasion offered. In his maturity at Bern he produced his important writings, and the impulse of those writings is still upon us.

There was invalidism in his life. It was a mighty soul in a feeble body. He suffered much. In old age he was forced to the use of opium, and he died with finger on pulse; his last words, "The artery no longer beats."

JOHN HUNTER

1728 TO 1793

"Up from Earth's Center through the Seventh Gate
I rose, and on the Throne of Saturn sate,
And many a Knot unravel'd by the Road;
But not the Master knot of Human Fate."

In Scotland have appeared two men, Hunter and Lister — great men in the history of surgery. Hunter dominates the eighteenth century; Lister is conspicuous in the nineteenth, — a man whose fame is destined to grow with the lapse of years. Hunter was greater than Haller in his influence on the practice of surgery, though the balancing of great men against each other is profitless. Hunter, Haller, Morgagni, are the famous names for us in the eighteenth century — Morgagni, pathologist; Haller, physiologist; Hunter, pathologist, physiologist, surgeon. It was time for Hunter. Since Vesalius and Paré experience had been accumulating, research had been extended, books had been written, and knowledge had been diffused. Many able surgeons also had lived in this interval: Hildanus (1560 to 1624), the "Father of German Surgery," a title properly belonging to Heister; John Schultes or "Scultetus" (1595 to 1645); Matthæus Gottfried Purmann (1649 to 1711?), a celebrated German; the Englishman, Richard Wiseman (1622 to 1676), known as the

English Paré; Alexis Littré (1658 to 1726), who proposed inguinal colostomy in 1710; Jean Louis Petit (1674 to 1750), the great French teacher and reformer; Henri François le Dran (1685 to 1773); Claude Nicolas le Cat (1700 to 1786), the lithotomist of Rouen; Dominique Anel (1678 to 1725?), of aneurism fame; Jean Louis Belloq (1730 to 1807), who invented the nasal canula. Among the contemporaries and seniors of Hunter were Pierre Joseph Desault (1744 to 1795); François Chopart (1743 to 1795); Raphael Bienvenu Sabatier (1732 to 1811); William Cheselden (1688 to 1752); Percival Pott (1713–1788). Such are a few of the striking names in the surgical literature of the period. All of those men were able, active, and highly intelligent practitioners. Most of them were popular teachers and reformers; they devised new instruments and procedures, they perfected old measures, they adopted and utilized new discoveries, they raised the standard of education, and they abolished the barber-surgeon. But there was no prophet among them. Haller, indeed, was a marvelous investigator and teacher, but he was not a practical surgeon, and his discoveries came slowly to fruitage. John Hunter was the man for whom the profession waited.

Not long ago a well-known teacher, in addressing an audience of physicians, said: "Surgeons in the past have devoted themselves to the studies of anatomy, pathology, bacteriology, but they have neglected physiology. It is to the teachings of physiology that the surgeons of the future must turn for advancement in their art." He forgot John Hunter. An English

writer has told us that to Hunter's sound teaching of anatomy, comparative anatomy, and pathology, and to the methods he employed and demonstrated to Jenner, Cline, Cooper, Abernethy, Home, Physick, and a host of others, the great nineteenth-century school of English surgery owes its fame. All that is true, but Hunter did more than that. He was a great philosopher in the broad sense, as well as a student of the natural sciences. To this day his genius dominates and inspires our science. For nearly one hundred years the Hunterian Oration, instituted in 1813 by Baillie and Everard Home, has perpetuated the work and teachings of this man, and has drawn lessons from his career. So our materials for a study are abundant, and our accumulated knowledge of him is great.[1]

John Hunter was a Scotchman, of good, robust, middle-class stock. He owed a good deal to his ancestry, probably; certainly many of his immediate relatives distinguished themselves and showed the advantage of a clean and vigorous heredity.[2] Hunter's father is described as a small farmer living on his own estate, Long Calderwood, in the parish of Kilbride

[1] The best "Life" is that recent one by Stephen Paget. In 1841 Drewry Ottley wrote a dreary account of John Hunter, prefixed to Hunter's "Complete Works," edited by J. F. Palmer. Everard Home wrote a fragmentary and unreadable sketch of him for the first edition of the "Treatise on the Blood and Inflammation," 1794; and numerous writers, Sir C. Bell, Professor Owen, John White, and many authors of Hunterian orations, have dealt with phases of Hunter's life and work.

[2] Of his famous elder brother William we shall hear. His brother James, who died young, was a promising anatomist; his sister Dorothea was the mother of Dr. Baillie, the clinician, and of Joanna Baillie, the authoress.

East, Lanarkshire, and there John Hunter was born on the 14th of February, 1728, as he himself always stated.[1] He was the youngest of ten, five sons and five daughters. James was the eldest of the family; William, the fourth son, was ten years senior to John.

It is always interesting to learn something of a great man's formative years, but of John Hunter's youth we know little. He seems to have been a vigorous, out-of-doors lad, devoted to rural sports, little given to books, but neither indolent nor unobservant. Indeed, how could he have been either? The tireless student and keen observer of the fifties could not well have come out of a dull and obtuse rustic of the forties. They say his mother petted him, which is true, doubtless, for was he not the youngest of ten? And at seventeen he was sent to Glasgow to help straighten out the affairs of a good-for-nothing brother-in-law — a bootless errand; but fools are not sent on such errands save by the Dr. Primroses of this world. There is no doubt, however, that Hunter received scant schooling, and that in his young manhood he was ignorant of books; but he was vigorous and ambitious, and his horizon was not limited to the home farm, for his elder brothers had gone out into the world, and of William he was proud from his youth up. A word about that particular elder brother.

William Hunter was born in 1718, and from childhood was destined for the Church. He seems to have been an intelligent, sensible, attractive lad, eager in the pursuit of knowledge. At fourteen he was well ad-

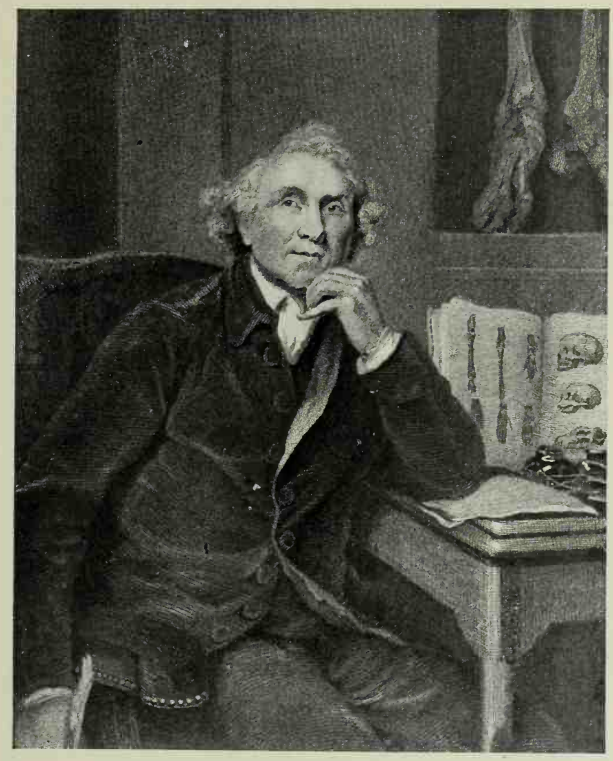
[1] The parish register gives *13th* February, 1728.

vanced in his studies, and was sent to the University of Glasgow. He became conspicuous there almost at once, but soon lost his purpose of being a clergyman. Meantime he had become intimate with William Cullen, six years his senior and a student of medicine. The intimacy bore fruit. Cullen, the future great teacher and clinician of Scotland, was astute even in his youth, and recognized William Hunter's abilities. So, upon Cullen's urging, Hunter entered on the study of medicine; from his nineteenth year to his twenty-second he was an inmate of Cullen's house. The next year, 1741, he spent in further study at Edinburgh, and then went to London to broaden his education and find a wider field for practice. It was a courageous undertaking and marks the man. Scotchmen were then few in London; George II was still living; Lord Bute did not come into power until eighteen years later, and Englishmen had not yet learned to complain that the king's favorite kept in his pocket all the offices and all the honors for his beggarly countrymen from beyond the border.

When William Hunter went to London, he had to depend upon his little family estate, unusual gifts of brain power, a good education, and an introduction to Dr. James Douglas, an anatomist and obstetrician of some note. Douglas took a fancy to him at once; he received him into his house, made him tutor to his son, employed him as a prosector, secured for him a position as surgeon's pupil at St. George's, and procured for him first-class anatomic instruction under Dr. Nicholls. Douglas died, unfortunately, in the following year, but

Hunter continued to live for a time in his family, and rose rapidly in professional esteem. He soon began lecturing on surgery and anatomy, and proved himself one of the ablest and most popular teachers in England. In 1747 he became a member of the Corporation of Surgeons;[1] and in 1748 made a medical pilgrimage on the Continent. Then gradually he gave up surgery, to devote himself to obstetrics, anatomy, physiology, and general practice. In 1748 his brother John joined him in London, and in 1750 he received the degree of M.D. from Glasgow, his Alma Mater. The great Hunterian Museum of Glásgow was bequeathed by William Hunter to that university, and stands a splendid monument to its founder. He was now well launched upon his life work, and there for the present we leave him; with this reflection, that his training and career were quite other than those of his more famous younger brother. He was an accomplished student and a university product. He was bred up in the best traditions of his profession. He was agreeable, spirited, interesting, an effective public speaker and a popular, inspiring, lucid teacher. Dignified, but apt, brilliant, and convincing in conversation, he was the friend of eminent men from his first coming to London. The best professional society frequented him, he became a member of learned bodies, and he held the respect and friendship of men of all ranks in that eighteenth-century England.

[1] The Corporation of Surgeons, under a new charter, became the Royal College of Surgeons in 1800, and took over the Hunterian Museum from the government.



JOHN HUNTER

John Hunter, such a rough lad as we have seen, went up to London, to his brother William, in the autumn of 1748. He was twenty years old. He went to London of his own motion, stimulated by the growing reputation of his brother, and his brother received him kindly. One may fancy the intercourse of this ill-mated pair, but William seems always to have been patient and generous. Such discord as arose was John's doing, mostly. The lad was a bear, and very much of a bear he remained to the end of his days — jealous, rude, outspoken, much self-centered, intolerant; of an ungovernable temper, given to very naughty language, frequent with oaths. In his youth boisterous, a hard drinker and worse, he was fond of horseplay and addicted to low company, I fear; but always kindly, generous, impulsive, a stanch friend, a good hater. His professional ethics were second rate, his contempt of empty dignities and humbug was shouted from the house tops. But he was as sound and unreasoning a Tory as his contemporary, Dr. Johnson; and his patriotism was unswerving and articulate. He hated fiddlers, laced ruffles, and Frenchmen.

John Hunter was not the first of the brothers to be attracted by William Hunter's work in London. A few years before this his eldest brother James had given up the law and entered William's dissecting room, where he came to be regarded as a promising anatomist, in the course of a year. But his health gave out; he returned to the home in Scotland and died there. John Hunter was physically sound at the outset — fortunately for him and for us. He plunged into his

work with enthusiasm, and he clung to it for forty-five years. His brother William found employment for him at once, preparing a dissection of the muscles of the forearm in anticipation of his lectures, which began three weeks later. The young man had had no previous acquaintance with his subject, but succeeded so well that he pleased his elder, who continued to encourage him in such studies, until, at the beginning of the second session, he was given charge of the dissecting room and the instruction of the pupils. So he went on. It is easy to see where he got his knowledge of anatomy, but just where he acquired early that broad knowledge of the allied sciences and of general medicine is not so obvious. Hunter used to assert, and writers have continued to tell, how he was without a training in letters, and was ignorant of what his predecessors and contemporaries did for the science of medicine. It is hard unreservedly to accept such statements, especially when we know that in later life he was a constant associate of learned men and a valued contributor to their discussions. We know, too, that in 1748 William Hunter was a companion of such men, who made his house a rendezvous. So the younger brother, from his twenty-first year, breathed an atmosphere charged with things good for intelligent minds, and doubtless was encouraged to read as well as to listen and to think. From the first, however, he did his own thinking; there can be no doubt about that, as one sees from his givings-forth. Few young men have acquired formed habits at twenty, so that we may believe these new friends helped to direct his energies and to stimulate his am-

bitions. At any rate, his brother had no intention that he should remain a mere hack, and so the year after John's arrival the youth was placed under the tuition of the famous Cheselden at the Chelsea Hospital.

It is worth our while to glance a moment at Cheselden, one of the most eminent of that school of ancient surgery which was passing — for the passing of which Hunter himself was to be in great measure responsible. WILLIAM CHESELDEN was himself a pupil of William Cowper, an anatomist and surgeon of Stuart times, and almost a contemporary of Sydenham and Locke. Cheselden was educated at St. Thomas's Hospital, became an able anatomist and a skillful operator while a young man, and for more than twenty-five years was regarded as the leading surgeon in England. He perfected the lateral operation for stone; he was the first to operate for artificial pupil; he was a member of the Royal Society, surgeon to St. Thomas's, St. George's, and the Westminster hospitals, and the last warden of the Barber-surgeons' Company, immediately before the separation of the surgeons and barbers in 1744. Moreover, he was a kindly, accomplished, forceful, well-bred man — a gentleman of the old school, our fathers would have called him, an impressive character and a notable teacher. So there we have John Hunter, living with his brother William, the accomplished scientist, and learning to practice under Cheselden, the foremost surgeon in the country — truly an admirable school for a rude country boy.

The young man's experience of teachers was to be varied further. In 1751 Cheselden retired from the

Chelsea Hospital, the year before his death. Accordingly Hunter transferred himself to St. Bartholomew's, where he became a pupil of Percival Pott, then in early middle age and vigorously at work. Pott was another admirable man, a man worth our acquaintance; a sound surgeon and a sound teacher, he was not yet known to fame, but was still in the enthusiastic, accumulating stage, when a man can do most for his pupils. He lived to be Hunter's rival and critic, but he always thought honestly and fought squarely.

Hunter remained with Pott for three years, and then, in 1754, became surgeon's pupil at St. George's, where he was appointed house surgeon in 1756. Meantime, in 1755, his brother had entered him at Oxford, but he himself, at the age of twenty-seven, did not relish the idea and never kept his terms. The tale is often quoted that years afterward Jesse Foot, a surgeon and publicist, disparaged him for his ignorance of the ancient classics. Said Hunter, "Jesse Foot accuses me of not understanding the dead languages; but I could teach him that on the dead body which he never knew in any language dead or living." Hunter was never overmodest, and Foot was a foolish person, whose jaundiced "Life of Hunter" you shall read with groans.

Hunter chose St. George's because he had decided to be a surgeon, and because that hospital offered the best chance of future promotion. But he never neglected his anatomy in the midst of diverse other pursuits, and kept at work as pupil and tutor in his brother's dissecting room throughout those ten busy

years. Hunter was as busy a man as Haller. We have seen Haller devouring books. However little or much Hunter did of that, he was a tremendous worker in his own line — laboratory research; and we shall hear how he was content with four hours of sleep, scanty rations, and little play. Even in those early years he was discovering things. Among other feats he solved the problem of the descent of the testis in the fetus, he traced the ramifications of the nasal and olfactory nerves, he tested experimentally the question whether veins could act as absorbents, he studied the formation of pus, and the nature of the placental circulation, and, with his brother, he practically proved the function and importance of the lymphatics.

All that brings us to 1759. He was now thirty-one years old; he had worked without ceasing in London for eleven years, and he broke down. That marks the end of his schooling and his youth. From now on we must think of him as the man of action — army surgeon, collector, investigator, teacher, writer, practitioner, and, toward the end, martyr to a fiery temper and a fatal, agonizing disease.

Hunter's breakdown, in 1759, did not result seriously, though it disturbed his friends and alarmed himself. He was thought to have incipient phthisis, so he determined to find work and a residence out of England for a time. In the following year he secured a commission as staff surgeon to Hodgson and Keppel's futile expedition to Belleisle — the same expedition which Thackeray has rendered forever comic in his account of Harry Warrington chased by the dragons.

Hunter returned unscathed, and the next year went to serve with the English forces on the frontier of Portugal. We cannot stop to learn of his army life except to note that for four years he was with the troops and acquired a great experience in the treatment of gunshot wounds. He came to regard the presence in the tissues of a bullet as not in itself harmful, thus coinciding in opinion with his predecessor Paré. He was too intelligent and diligent a man to content himself with the mere discharge of his duties, arduous as they were, but was continually engaged in physiologic and other researches. He studied the conditions of the coagulation of the blood, he continued his old anatomic work, and he collected a great mass of memoranda on inflammations. In those years, too, he began his exhaustive researches into the habits, functions, and structure of plants and animals. He learned that digestion does not go on in snakes and lizards during hibernation, and that the creatures will die in that season if they are put through vigorous movements; so he was led to an interesting conclusion which he applied to his human patients; namely, that if the powers of a part are diminished through gangrene or local necrosis, stimulants are dangerous, since they "increase action without giving real strength." Soon after his return from Portugal he wrote out a catalogue of his specimens, and recorded notes of about two hundred normal and diseased structures. He retired on half-pay in 1763, at the end of the Seven Years' War, but those four years were not the least important for health and progress in his life, and he was wont to look back on them with satis-

faction. The experience reminds one of what Darwin, Huxley, Beaumont, Reed, and other distinguished men have known. There is place in the public service for scientific work of the highest type, as we have learned.

We find Hunter, then, at the age of thirty-five, in London, with a start still to make, on a short allowance, but splendidly equipped in courage, ability, and training for the task before him. He proposed to be a practicing surgeon; meantime he must live. So he began teaching anatomy and operative surgery to private classes, and renewed his acquaintance with the resurrection man. Such teaching was his forte. He never enjoyed formal lecturing; indeed, when he took up that work later, he did so with dread. He began each course with embarrassment and hesitation, and used to fortify himself with a large dose of laudanum before his introductory lecture.

Scant practice and a daily class would have left most men with abundant leisure, but Hunter had no leisure in life. He went on at once with the further study of comparative anatomy, and for subjects obtained animals dying in the Tower menagerie and in traveling zoölogical shows. He worked even when he was ill. They tell how he ruptured his tendo Achillis, and while so disabled experimented on the tendons of dogs. He devised the familiar operation of subcutaneous tenotomy, killed the animals at various stages of their convalescence, and through those studies ascertained the method and course of tendon healing. Out of such work grew the modern operations of that nature.

In 1767 he was made a member of the Royal Society — a fact noteworthy, since he had as yet published but one brief paper, and his brother William did not receive the honor until several years later. Evidently the great ability of the younger man was already making itself felt. The next year, 1768, he was appointed surgeon to St. George's Hospital and became a member of the Corporation of Surgeons, five years after settling to practice; and now he established that routine of daily life for which he was remarkable to the end. All great scientists have been workers, but Hunter worked in a fashion unknown even to our incessant modern life. He rose at five o'clock, and without waiting for a decent toilet hastened to his private dissecting room. There he worked until nine o'clock, when he snatched a hasty breakfast. He was methodical. From breakfast time until twelve he received office patients, and at twelve promptly, no matter who waited, he went out to make professional calls and his hospital visit. He returned home at four, and dined. He ate abstemiously and, for the last twenty years of his life, drank no wine. After dinner he slept for an hour, and at half-past five went to work again. Those evening hours were his most effective hours. He kept at it incessantly until after midnight, going to bed between one and two in the morning. He must have been a cheerful companion for his wife; for he married, of course, and in some fashion managed to beget and rear children. Mrs. Hunter was the daughter of a Mr. Home, a struggling army surgeon, and for this lady, in his early poverty, Hunter had to wait several years. He married her finally against the

protests of his worldly-wise brother, whose opposition to the match is said to have been the beginning of that breach which finally separated the two men. John Hunter's wife was a good wife to him, though his selfishness and rough manners must have tried her sorely. She was a pleasant, social body, given to cakes and ale, and rather partial to those fiddlers and Frenchmen whom her husband abominated. Here is a somber tale of social misadventure: "On returning late one evening, after a hard day's fag, he unexpectedly found his drawing-room filled with musical professors, connoisseurs, and *other idlers*, whom Mrs. Hunter had assembled. He was greatly irritated, and walking straight into the room addressed the astonished guests pretty much in the following strain: 'I knew nothing of this kickup, and I ought to have been informed of it beforehand; but as I am now returned home to study I hope the present company will retire.'" [1] He was a good old-fashioned British husband, and his sprightly wife remained faithful to him, though he bullied her while he lived and left her penniless when he died. Mrs. Hunter had a younger brother, Everard Home, twenty years Hunter's junior. The lad became a member of their household, studied surgery under his distinguished kinsman, was taken into his confidence, was made his assistant, partner, and executor, grew to fame on his fame, — Home was not without ability of his own, — and made himself forever infamous, long afterward, by burning a great collection of the Hunterian manuscripts in order to conceal his own literary

[1] Ottley.

pilferings — a scandal with which scientific London blazed in the early years of the last century.

In 1768, then, John Hunter found himself well established; he moved shortly afterward into his brother's former house, and began to take house pupils — many of them afterward famous. Of such pupils were Jenner, Guy, our own Physick, Lynn, and Carlisle. At St. George's he had Abernethy, Cline, Earle, and Astley Cooper, and he taught those young men to work as he worked himself. Early in his career Hunter recognized that, as yet, comparatively little had been done to explain the nature of disease, its significance, its relation to health, its progress, and its classification. Again we are confronted with the problem of Hunter's ignorance or familiarity with the accomplishments of other workers. Of course, he must have known the broad outlines, the common property of all physicians of his time, but he often seemed to feign ignorance, or, what is more probable, he distrusted published conclusions, and had pretty steady contempt for the capacity and observations of his fellows; not that he trusted himself implicitly, though he thought well of John Hunter; but he used to tell his pupils not to refer to what he had said the year previously, for he reserved to himself the right of changing his conclusions. At any rate, Hunter, unlike Paré, perceived that medicine was in its infancy, and he undertook the stupendous task of revolutionizing ancient methods of study and launching science anew upon sound and rational lines. He began with fundamentals; he insisted upon a review of anatomy; and he taught that a thorough knowledge

of embryology is essential to an intelligent pursuit of anatomy. Not only that, but he perceived the significance of the structure of animals of varying types, and of plants too. He had more than a suspicion of the evolution of species and their origin, and insisted that a foundation in medical knowledge could be acquired only from an exhaustive study of comparative anatomy and of animal and vegetable life. In such studies and in such teaching he was unwearied. Read his works, and you shall find an astounding variety of evidence that he had anticipated a thousand modern discoveries and had constructed hypotheses which have been adopted since as some of the important theories of recent research. Not content with such work, he was indefatigable in his investigation of physiologic problems in man, animals, and plants. In his own laboratory and with the rough tools at his command he performed experiments and reached conclusions not unworthy of a Harvey, a Haller, a Spallanzani, a Bichat, or a Claude Bernard; and he inspired with a like diligence and enthusiasm the few choice spirits who had the wit to appreciate his greatness and the courage to follow his lead. They were young disciples. Among his contemporaries he had no following. What great man's contemporaries ever did become his followers? Maturity does not seek novelty. The prophet must have young men about him if his words are not to fall fruitless. Were progress to depend upon a man's contemporaries, we should be in the stone age still. New life, new blood, fresh enthusiasm and vigor are needed for advance. The "judgment of experience"

expresses the recognition of familiar conditions; and experience is palsied in the face of novelty.

Fundamental work was Hunter's great work. It is for such that we hold him in the front rank of all our benefactors. He saw the meaning of science more clearly than any man who had lived; and he had the genius to make others see that meaning. That marks him as it marks the few rare spirits of his kind to whom men have given ear.

Hunter was not infallible. He made many mistakes; for he strove much and often, and such constant strivings end sometimes in error. But he was luminous and articulate to show the way, not hoping in one short life to reach the goal of all knowledge, but confident that from his Nebo his successors should advance upon the land which to him was vouchsafed as a vision only.

Hunter's method was rigid adherence to deduction founded upon observation and experiment; and his studies embraced an enormous field. Let us pass in brief review some of his better known contributions to science: In 1772 he published his first paper in the *Philosophical Transactions*, an essay on post-mortem digestion of the stomach, in which he explained that phenomenon as a result of the action of the gastric juice. In 1771 and 1778 appeared his essays on the teeth, whose natural history was explained and their diseases exhaustively considered. The work was an authority for three generations. In 1774 he read before the Royal Society a paper on birds, describing their manner of breathing, and a paper on the stomach of the Gillaroo trout. During these same years he was

busy with investigating the temperatures of animals under varying conditions, and his letters to Jenner, his constant correspondent, describe his elaborate clinical thermometer in a fashion worth reading. Such investigations led to a delightful paper, which he read before the Royal Society in 1778, on the "Heat of Animals and Vegetables."

Two years afterward, in 1780, Hunter presented to the Royal Society a paper which precipitated a bitter quarrel with his brother William, a quarrel which was healed a few days only before the elder's death, three years later. John Hunter's paper dealt with the structure and circulation of the placenta, with facts which he claimed to have discovered and established many years before, when working in his brother's dissecting room. Now, William Hunter had published the same observations in his work on the "Gravid Uterus" in 1775. The lie was given and returned publicly between these eminent men, and the Royal Society refused to print John Hunter's paper. He acted badly, whatever the rights or wrongs in the case may be. In this same year of 1780 Hunter read before the Society an account of a fetus, dead of smallpox, and a paper on the change of plumage in non-breeding hen pheasants. In 1782 there followed an essay on the organ of hearing in fishes.

Lectures, essays, letters, flowed from him continually during these years, but it was in 1785 that he made the observations and performed the operation for which he is best known to students of surgery — Hunter's operation for aneurism. The story is interesting and

illustrates the man. He happened in that year to be studying the mode of growth of deer's antlers. In July he had a buck caught, and tied one of its external carotid arteries. He observed that the antler which was nourished by this vessel became cold to the touch, and he debated whether this antler would be shed in due course or would be retained longer than usual. To his surprise he found, two weeks later, that the wound was healed, and that the antler was again warm and vigorous. He supposed the ligature might have slipped, so he had the animal killed, when, on examination, he was interested to discover that the ligature held, but that, through anastomosis and enlargement of small vessels above and below the occluded part, normal circulation had been restored to the growing antler. From this observation he was led to the conclusion that "under the stimulus of necessity" the smaller arteries are capable of rapid increase in size to perform the function of the larger.

Soon afterward he had an opportunity of applying to a human patient this newly discovered law. There entered the wards of St. George's Hospital a man suffering from advanced popliteal aneurism, and in approaching the case Hunter debated whether to employ the old method of Antyllus, — dissection and double ligation, — or to follow the practice of Pott, amputation well above the aneurism, declared by Pott to be the only safe method. Hunter was conservative in his practice. He abhorred meddlesome surgery, and used the knife when other means had failed only. He felt the operation of Antyllus to be dangerous, and the method of

Pott to be needlessly severe. He argued, however, that it would be reasonable to tie the femoral artery at that safe point where Pott would tie it in an amputation. He would not amputate, however, but would count upon the anastomosis for restoring circulation to the leg. Accordingly, he acted upon this reasoning, and with success. He tied the vessel in that intermuscular space known since as Hunter's canal, and was gratified after several hours to find that the temperature of the foot had not fallen, but had risen above the normal. The patient progressed satisfactorily, and six weeks later, with a sound and useful leg, was discharged from the hospital. The fame of this operation went abroad and aroused commotion. Promptly Frenchmen and Italians claimed priority for their countrymen, while many English surgeons, headed by the veteran Pott, denounced the procedure as dangerous and unwarrantable. But it gained ground and became accepted in spite of loud words. Wise men waxed enthusiastic over it, and the Italian Assalini, who saw it first performed, testified that it "excited the greatest wonder, and awakened the attention of all the surgeons in Europe."

In 1783 Hunter had taken a leading part in establishing the "Society for the Improvement of Medical and Chirurgical Knowledge," and several of his papers were read subsequently before that body. In that same year he read to them an admirable paper on "Phlebitis," the first paper we have which gives a satisfactory explanation of that affection; and in 1786 he gave to the world his famous book "On the Venereal Disease,"

a book long awaited by the profession, and an authority for fifty years thereafter. A few months subsequent to its appearance he published his work on the "Animal Economy," a collection of important papers consisting of many admirable anatomic descriptions, and accounts of numerous original researches in physiology. In 1787 he gave to the Royal Society a paper on the "Wolf, Jackal, and Dog," and a second paper, well illustrated, on the structure and physiology of whales.

In those years Hunter was overwhelmed with a thousand cares, and suffered much in health, so that his writings were few and at long intervals after 1787. In 1792, the year before his death, he contributed to the *Philosophical Transactions* a paper on bees, the result of his observations on the hive bees, studied for more than twenty years. His last printed book, a book regarded at the time as the most important of his productions, was posthumous, the final editing being done by Everard Home; its title, "A Treatise on the Blood, Inflammation, and Gunshot Wounds, 1794."

Thus, in a few words, I have told something of the more notable things which Hunter did, but the story is very bare. It would be interesting to look out with him upon the world in which he lived and learn something of what other men were doing. The influences which bore upon him, and the condition of Europe in that last half of the eighteenth century, were vital and remarkable. Politics and literature, philosophy and science, were undergoing profound impressions. Hunter was no closet student, but a man keenly interested in what was doing, and for long much in the eye of the

scientific world. All this must be a passing thought, however, but we may glance again at Hunter's life, his later years, and bring our story to a decent close.

One recalls certain facts not altogether agreeable or attractive, minor faults of temper and habit. His body was grievously overdriven by an iron will, so that there resulted ill health and a vicious temper, with which he struggled for years. Certain it is that he suffered from angina pectoris, and found little relief. Over-exertion brought on frequent attacks, and outbreaks of passion or the attempts to suppress passion were a constant dread to him. So far back as 1772 he began courses of systematic lectures which were a severe strain upon him, owing to his painstaking method and labored delivery. He published his lectures later — a standard work of immense learning and rare originality.

In spite of his labors and fame he never made much money, and what he did make went for specimens and apparatus. He was one of the greatest collectors ever known, and scoured the world through friends and messengers for the flora and fauna of all lands. Dozens of his letters to Jenner deal with the habits of the cuckoo; he sent a special expedition to the Arctic for specimens of the whale, and paid five hundred pounds for the skeleton of an Irish giant.

I have said that it was Hunter's conception and teaching of science which mark him the great man, but to his immediate successors and to the casual reader of to-day he is best known for his museum. The Hunterian Museum was the means to an end, but it was a magnificent means. Measured in bank notes, it cost

him upward of three hundred and seventy-five thousand dollars. After his death it was sold for seventy-five thousand.

Hunter seems to have valued money as of service only to enrich his collection. Up to 1780 his income ranged between five and ten thousand dollars a year. For a few years before his death it reached twenty-five thousand, and in one year more than thirty thousand dollars. Most of his contemporaries regarded his love of collecting as an eccentricity and his devotion to science as almost a mania. Few perceived the drift of his biologic researches, and his investigations in comparative anatomy were looked upon as works of unprofitable curiosity. Even his friend, Sir Joseph Banks, the president of the Royal Society, wrote, three years after Hunter's death, that he did not believe the Hunterian collection to be "an object of importance to the general subject of natural history, or indeed to any branch of science except to that of medicine."

The collection is estimated to have contained 13,682 specimens: In the physiologic department, 7295; in the pathologic, 2678; and 3709 fossils. In the year 1800 it was acquired by the Royal College of Surgeons, since when it has been greatly increased, thanks largely to the efforts of its distinguished line of custodians, William Clift, William Home Clift, Richard Owen, J. T. Queckett, and William Fowler.

A writer [1] has defined the scope of these labors of Hunter as the explication of the various phases of life exhibited in organized structures, both animal and vegetable, from the simplest to the most highly dif-

[1] F. H. Butler.

ferentiated. Hunter did not employ comparative anatomy in subservience to the classification of living forms, as did Cuvier, but in order to ascertain the principle which animated and produced those forms — a principle by virtue of which it appeared that all forms were allied to himself. He was continually asking himself, In what does life consist? He came to teach that "life is a principle independent of structure, most tenaciously held by the least highly organized beings." Abernethy says he perceived life to be "a great chemist," a power capable of manufacturing a variety of substances into one kind of generally distributed nutriment, and of furnishing from this a still greater variety of dissimilar substances. Hunter found, in short, that there exists in animals a latent heat of life set free in the process of death. "Mere composition of matter," said he, "does not give life; for the dead body has all the composition it ever had; life is a property we do not understand." As a bar of iron may gain magnetic virtue by being placed for a time in a special position, so, perhaps, the particles of matter arranged and long continued in a certain posture eventually gain the power of life. "I inquired of Mr. Hunter," writes Staple, "if this did not make for the exploded doctrine of equivocal generation; he told me perhaps it did; and that as to equivocal generation all we could have was negative proofs of its not taking place. He did not deny that equivocal generation happened."

Hunter held certain interesting views on geology. In water he recognized the chief agent for producing terrestrial changes; but he held untenable the popular

notion that Noah's deluge might account for the marine organisms discovered on land. From the diversity of the situations in which many fossils and allied living structures are found he was led to infer that at various periods there had taken place not only repeated oscillations of the level of the land, lasting thousands of centuries, but also great climatic variations. The following striking paragraph of Hunter's is from Butler's essay: "If we were capable of following the process of increase of the number of the parts of the most perfect animal, as they first formed in succession from the very first to its state of full perfection, we should probably be able to compare it with some of the incomplete animals themselves, of every order of animals in the creation, being at no stage different from some of those inferior orders; or, in other words, if we were to take a series of animals from the most imperfect to the perfect, we should probably find an imperfect animal corresponding with some stage of the most perfect." In spite of involved phrasing, this thought, coming to us out of the eighteenth century, is supremely interesting.

Such were some of Hunter's labors and teachings. Like every genius, he kept himself young, and projected himself beyond his generation. As he advanced in years and grew to fame his fits of temper and his intolerance of opposition increased upon him. It was his temper that killed him. He had become unavoidably concerned with medical politics — a field in which he was not calculated to shine. There came to be bad blood between himself and his colleagues at St. George's

because he announced that they were neglecting the surgical pupils and that thereafter, as he was doing most of the work and attracting most of the students, he should not turn in the fees to the common purse, but would keep them for himself. The governors of the hospital ruled against his decision, and provided, in addition, that thereafter no student should be admitted who had not been educated in medicine. This last rule seemed to be aimed at Hunter. It irritated him particularly because, soon after, there came up to London two young Scotchmen, ignorant of the new law but seeking to be taken on as his pupils. He explained to them the situation, but promised to do what he could. For that purpose, on the 16th of October, 1793, bent on seeing his Scotchmen through, he attended a meeting of the Hospital Board. Ottley tells the story: "Arrived at the hospital he found the Board already assembled, and entering the room, presented the memorial of the young men, and proceeded to urge the propriety of their being admitted. In the course of his remarks he made some observations which one of his colleagues thought it necessary instantly and flatly to contradict. Hunter immediately ceased speaking, retired from the table, and struggling to suppress the tumult of his passion, hurried into the adjoining room, where, with a deep groan, he fell lifeless."

It is a pathetic and tragic scene. One fancies the winged words that may have passed, the taunt of that nameless colleague, who was probably in the right, the fury of Hunter, who was probably in the wrong. Rembrandt should have lived, and added that picture to

his collection. The fate of those two disappointed young Scotchmen has not been told.

Look back the hundred and fifteen years which have passed since Hunter died; think what his life means for science and what is the estimate placed upon it by the average physician of to-day. The Englishmen have done their best for him, to be sure. Two of his influential relatives established the annual Hunterian Oration, which survives; but in the profession at large he is little more than a myth. A recent publicist says of him, that he stands for a book of surgical lectures, a treatise on venereal disease, and the operation for aneurism. He stands for far more. Those things were by-products dropped from the seething laboratory of his brain. He means for us the first and the greatest English-speaking exponent of proper scientific research. He is the father of us all, physicians, surgeons, laboratory students, for he wrought mightily in all fields.

John Hunter inspired little personal affection or devotion, though he inspired admiration and respect, for his was a vast genius. His disciples recognized the genius; few loved the man. With him it was not as with Hippocrates or Paré or Boerhaave or Haller. It was a fiery soul — onrushing, fierce, eager, intolerant, unsparing of others as of himself; the body exhausted out of season, the task unfinished; but his works do follow him. In modern days only have we come to see that sound knowledge and appreciation of science must be sought along those lines laid down through toil, criticism, and weariness by the indefatigable John Hunter.

AMERICAN SURGERY

It is interesting, before going on with the narrative of world surgery, to glance more particularly at the progress of surgery in this country, so far as one may in brief retrospect and without becoming involved in a discussion of the achievements of living men.

The best early American surgery grew out of English surgery, with John Hunter as the prophet, and as our best surgery was for nearly a century dependent on the teachings of Europe, it may be divided conveniently into three eras: the Hunterian era, the middle or French era, and what we may call the German-American era. Let us note, then, some of the great American surgeons in each of these periods, and recall a few of their important deeds, but with this prefatory consideration: until within recent years American life has furnished little opportunity for the closet student and the laboratory student of science. Some great surgeons have lived and flourished among us, but the stress of life and the circumstances of their being have forced them into practical work, into personal relations with their fellows. With a few exceptions they have created no great new thing, but they have been able exponents of borrowed work, and they have been daring practical operators of the highest type. The story is one of great clinicians.

JOHN JONES. — American surgeons must look back to John Jones, of New York, as the first of their eminent professional forebears. Jones was born in New York City in 1729, so that he was a contemporary of Washington. He did his work in his native place, and there he died in 1791, at the age of sixty-two. It is a forceful, sterling character, of value in those days to the patriot cause in arms. Jones may be called a disciple of the Hunterian era, though, in fact, he was but one year younger than John Hunter himself. But Hunter and Jones studied in the same schools and knew the same masters, and the younger man came to be influenced greatly by the work and teaching of his more famous English contemporary. Jones studied in London under Percival Pott; in Paris under the great French reformers, Petit and Le Dran; and in Edinburgh under the elder Monro. He became distinguished in colonial annals as surgeon to the troops in the old French War of 1758, and then, upon the foundation of King's College, he was made the first professor of surgery, in 1767. The chroniclers note of him that he was the first American to perform the operation of lithotomy.

John Jones's most conspicuous work, and that for which he is commonly quoted, is his book entitled "Plain, Concise, Practical Remarks on the Treatment of Wounds and Fractures," New York, 1775, reprinted at Philadelphia in the following year, with Van Swieten on "The Diseases Incident to Armies and Gunshot Wounds." This little book became the *vade mecum* of Continental surgeons during the Revolutionary War.

Jones attempted little more in it than to condense the teachings of Pott and Le Dran; but there are a few notes of originality, the most conspicuous being a case of trephining in delirium, eighty days after a slight head injury. The dura was opened and drained, and the patient promptly recovered.

After the war, Jones went on with teaching and practicing until his death. He was a useful and honorable man, an admirable type of the best of that long line of surgeons with whom we have to deal.

William Shippen, Jr. — The second of our early surgeons, a contemporary of Jones, was William Shippen, Jr., of Philadelphia. Like Jones, and like most eminent American physicians of his own and the succeeding generation, he was admirably educated in foreign schools. Shippen was born in 1733, and studied in Leyden, Edinburgh, and London. He was a special pupil of William Hunter. To us he is memorable for two things: with John Morgan he founded the medical department of the College of Philadelphia (later the University of Pennsylvania), and he served with distinction as physician-general to Washington's armies from 1777 to 1781. Next to Morgan and Rush he was probably the most distinguished American physician of his generation, and the conduct of his department during the war was admirable and creditable. Though an able and popular teacher he seems to have added nothing of importance to the science or art of surgery.

John Warren. — Somewhat younger than the two distinguished representatives of New York and Philadelphia was John Warren, of Boston; indeed, he

belongs almost to another generation. Warren was born in 1753, a younger brother of that General Joseph Warren, famous as a hero of Bunker Hill. Unlike Jones and Shippen, Warren found his education entirely in America; but, in spite of this apparent disadvantage at the start, he is eminent in our annals as a great clinical teacher and surgeon, and as the founder of the Harvard Medical School. So one observes that these three men, our first distinguished surgeons, living haply in different towns, are notable chiefly as founders and first surgical professors in our three oldest and most famous medical schools. Warren served with distinction as hospital surgeon during the Revolution. For some months before the conclusion of peace he was in charge of a great military hospital in Boston, where he found material and opportunity for teaching and operating, and it was almost immediately after the dissolution of this hospital that he assisted in the foundation of the medical school, in which he was appointed to the chair of anatomy and surgery, where he labored until his death, in 1815.

American surgeons will remember that we owe more than a casual glance at these three men. In the straitened and difficult circumstances of our colonial and early national life, the foundation of schools and hospitals was a gigantic task; for be it noted that hospitals often followed or were associated with the foundation of schools. In England hospitals long antedated schools, and out of hospitals schools arose. Our surgeons, living in sparsely settled communities, where extreme poverty was little known, were able to

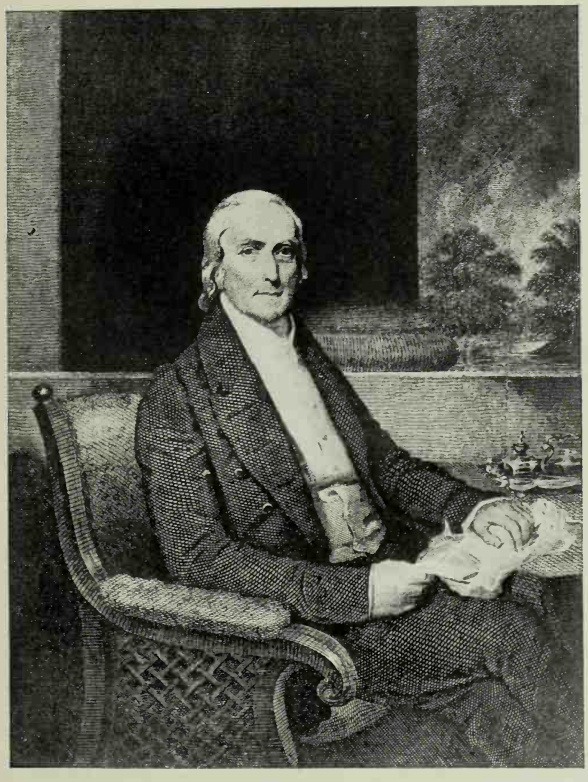
bring about the foundation of hospitals with difficulty; but the need of proper medical education appealed more directly to their constituents, so with the beginnings of our national life schools sprang up here and there, and with the development of a more complex civilization, hospitals, too, came to find their place.

Partly, perhaps, on account of the paucity of schools and hospitals, and partly owing to the strenuous forward march of our civilization, behind which schools and hospitals lagged for many years, we find that all of our great early surgeons are not to be discovered in the medical centers. The seaboard towns furnished admirable and well-equipped practitioners; but able practitioners were found on the frontier also, and when we study the surgical annals of the last century, we encounter records of accomplishment not alone in the Eastern States, but we hear of voices raised in the Western wilderness.

Philip Syng Physick, called the Father of American Surgery, is perhaps the most widely known surgeon in our annals of the last century. Certainly he should head the Hunterian era among us; for he was a personal friend and pupil of John Hunter, and his life was dedicated to practicing and teaching the principles of that great man. Physick was born in Philadelphia in 1768, was educated in Edinburgh and London, and became surgeon to the Pennsylvania Hospital in 1794. In 1805 he was appointed to the chair of surgery in the University of Pennsylvania. Unfortunately, he contributed little to the literature of surgery, and his fame rests on the tradition of his operations,

the tales of his pupils, and the compend of his practice, published by his nephew, Dorsey. Physick maintained the unfortunate sedentary habits common to his generation, and encouraged thereby a chronic dyspepsia, a recluse temperament, and a somewhat morbid view of life. He is not an interesting character; but he was a profound student, a clear-headed practitioner, and an ingenious mechanician. In a multitude of ways he improved the technic of American surgery, and seems to have done faithfully and well whatever he attempted. He bettered the famous long splint of Desault; he performed internal urethrotomy for stricture; he employed the seton for ununited fractures; he invented the stomach pump for cases of poisoning; he bled to depletion preliminary to reducing long-standing dislocations; he was a lithotomist, and at the last, in his terror lest his body be dissected, he provided that the corpse should be guarded for many weeks after his decease.

Wright Post. — After Physick there are two New York surgeons, Post and Mott, who are worthy of our study. Mott's is the greater name, but Post was the first New York surgeon of eminence in the nineteenth century. Wright Post was born in New York in 1766, nine years before the outbreak of the Revolution. He studied in London under Sheldon, and six years after his return home was appointed professor of surgery in Columbia University, in 1792, when he was but twenty-six years old. He taught and practiced for thirty years longer and died in New York in 1822. The man is notable as a daring operator and skilled



Philip Syng Physick

anatomist. He first, in this country, in 1796, performed Hunter's operation for aneurism of the femoral artery; in 1817 he ligatured the subclavian artery in its outer third, and in 1813 he ligatured successfully the external iliac artery — the second operation of its kind to be performed. His name is familiar, and was famous among New Yorkers one hundred years ago.

Valentine Mott was nineteen years junior to Post, and lived down to modern times. I know of no man more famous among New York surgeons. His life is an inspiration to students; but we have space for the briefest outline only. He was born on Long Island in 1785. He died in 1865, the last year of the Civil War. After his graduation in medicine from Columbia in 1806, Mott studied for some years in London, part of the time under Astley Cooper, and returned to this country in 1810. He was appointed professor of surgery in the Columbia School, and retained the chair when that school was merged into the College of Physicians and Surgeons in 1813. He was a teacher all his life and in sundry schools. His private classes were large and lucrative. In 1826 he was for a time professor of surgery in Rutgers College; and again in the College of Physicians and Surgeons, resigning in 1834. In 1840 he became professor of surgery in the University of New York, and finally, in 1852, retired with the title of Professor Emeritus; even then he continued his annual course of lectures until his death at the age of eighty.

To the student of surgical history the reasons for Mott's permanent fame are not altogether clear, but

among his contemporaries he was regarded as an heroic figure. He was a man of distinguished presence, of instant popularity, courtly, kindly, polished, with a sound and wide-grasping mind, highly cultivated under the best teachers, with a far-reaching ambition and an intimate knowledge of professional needs in our developing American life. He did a great number of things, and he did them boldly and skillfully. His fame became established through his ligature of the innominate artery, for the first time on record, in 1818. The case must be counted as unsuccessful, though the patient lived several weeks, and it is worthy of note that the first successful case of the kind was in the hands of another American surgeon, A. W. Smythe, of New Orleans, who performed his operation in 1864. Mott is known to us especially for his work on aneurisms. He tied the common iliac in 1827, and during his career he was able to record the ligature of 132 of the great vessels, including 8 of the subclavian, 51 of the common carotid, 6 of the internal iliac, 57 of the femoral, and 10 of the popliteal. In 1828 he removed the entire clavicle, for osteosarcoma, and he was wont to refer to this as his Waterloo operation. In 1821 he excised the right half of the lower jaw, unaware at the time that a similar operation had been performed in 1810 by W. H. Deadrick, of Tennessee. It is needless to rehearse the multitude of Mott's performances. They were regarded as epoch-making; but enough has been said to illustrate the man and the distinction of a character which is still numbered among the greatest of American surgeons.

EPHRAIM McDOWELL deserves our gratitude; his life was romantic and his fame posthumous. He was born in Virginia in 1771, and removed, when a boy, to Kentucky. With the exception of one year, 1793, spent in Edinburgh under John Bell, his life was passed in Kentucky, where he practiced at Danville. In 1809 he performed ovariotomy. In 1817 he reported this case with two others in the Philadelphia *Eclectic Repertory*,[1] but the world regarded him not. It was only in later years that the greatness of his performance became recognized, and now he has long been known as the pioneer ovariotomist.

With McDowell one couples NATHAN SMITH, another frontiersman in American surgery, though he lived in New England and was widely known as teacher and physician. Smith was born in 1762 in Massachusetts, and grew to manhood a farmer's boy in Vermont. Then ambition seized him; he returned to his books, studied under a preceptor, was graduated in medicine from Harvard in 1790, and founded the Dartmouth Medical School. There he did almost all the teaching for many years, occupying what Holmes has wittily described as not a "Chair" but a "Settee of Professorships," until he had placed the department upon a strong foundation, when, in 1813, he accepted the chair of medicine and surgery in the newly established Yale Medical School, at New Haven. His fame rests upon his founding of Dartmouth, his teaching of clinical medicine, — notably his exposition of typhus

[1] *Eclectic Repertory and Analytic Review*, vol. vii, p. 242. Philadelphia, April, 1817.

[typhoid] fever, — and especially upon his work as a surgeon; for he, too, was a pioneer ovariotomist. He operated upon his much-quoted case in 1821, ignorant of McDowell's work. He tied off and dropped the pedicle, which McDowell had not done, and his patient recovered. Smith's life was crowded with teaching, writing, and practice; and he left a reputation which has endured.

John Collins Warren. — After Physick and Mott, John Collins Warren is probably the most eminent American representative of our Hunterian era. He was the eldest son of John Warren and was born in Boston in 1778, four years before the founding of the Harvard School. Unlike his father, he received a foreign education, studying in Paris and Edinburgh, and in London under Astley Cooper. For more than fifty years he was the leading surgeon of New England. He was professor of anatomy and surgery at Harvard, and with James Jackson founded the Massachusetts General Hospital in 1811, where he served as senior surgeon for more than thirty years. As time develops and we get a better perspective of Warren's life, we are coming to appreciate his great service to American surgery and to American medical education. He was one of the early presidents of the American Medical Association. As an operator he was exact, painstaking, rapid, and successful. His observations were sound, his writing lucid and instructive. He was one of the first in this country to excise the hyoid bone, to perform osteoclasis, excision of the head of the humerus, staphylorrhaphy, and external urethrotomy,

EPHRAIM McDOWELL

and his work on the excision of tumors is notable. He organized a great hospital on lines and with methods which persist to this day, and, most important of all, he first dared to employ ether anæsthesia in surgery, in the year 1846. The story of the great ether controversy — who discovered anæsthesia? — is more than a twice-told tale, and needs no rehearsing now. A word, though, about the significance of that same anæsthesia. Before its time surgical operations were dreadful things — a hell to patients and a purgatory to operators. Indeed, most of the great and humane surgeons hated and dreaded severe operations. John Hunter is often quoted as asserting that an operation is a confession of failure, and is the last resort of our art. Cheselden, Brodie, Warren, Liston, Simpson, and dozens of others bore similar testimony. The frightful shrieks from ancient hospital amphitheaters still ring in the ears of those of us whose ears are open.

As a consequence of such conditions, operations were rare in civil practice. Keen[1] has given some interesting figures: "It is a striking commentary on the immediate results of anæsthesia to learn that in the five years before the introduction of ether (1846) only one hundred and eighty-four persons were willing to submit themselves to such a dreadful ordeal in the Massachusetts General Hospital — an average of thirty-seven operations per annum, or three per month. In the five years immediately succeeding its introduction, although the old horror could not at once be overcome, four hundred and eighty-seven operations, or

[1] W. W. Keen, "Addresses and Other Papers," page 287.

almost one hundred annually, were performed in the same hospital. During 1898 in the same hospital . . . over 3700 operations were performed."

Anæsthesia did not spring full-fledged from darkness. For years men sought it, and some thought they had found it. It was a shrewd American dentist, W. T. G. MORTON, who established publicly the use of ether as a safe and sure anæsthetic, in 1846. His first demonstration was made on October 16 of that year, at the Massachusetts General Hospital in Boston, and John Collins Warren, the senior surgeon, then in his sixty-ninth year, was the daring operator to sanction and utilize the experiment. For several years Morton had considered this question of anæsthesia. He had seen nitrous oxid tried, and he had experimented with sundry substances. C. F. Jackson, the chemist, had encouraged him to employ sulphuric ether, which he did by tests upon animals, upon himself, and upon one other patient before making his public demonstration. The achievement was an admirable piece of scientific work, for which the man received scant reward. However, anæsthesia was accomplished: the use of ether, and the next year of chloroform, became universal throughout the civilized world, and the science of medicine moved forward into the antiseptic era, which occupied the next generation. Though Warren did not *discover* ether anæsthesia, the profession must not forget its debt of gratitude to him for courageously seconding the discoverer and risking his great reputation and his patient in an unexplored field. Warren died in 1856, having lived to see his

son, J. Mason Warren, associated with himself as colleague at the Massachusetts General Hospital. After a successful career J. Mason Warren in turn was succeeded in the same hospital by his son.

Mott and J. C. Warren may be regarded as the last American exponents of the Hunterian era.

The middle American period is rich in conspicuous names and is notable for two events — the introduction of ether anæsthesia and the surgery of the Civil War. Most of the men famous in this period were educated in Europe, because to Europe we still turned for the best original work in science and for the experience of great clinics. With the Napoleonic era the Paris school became conspicuous and popular. It was favored by the government, and unusual opportunities were offered there for the study of anatomy and clinical surgery. Less and less, as time goes on, do we hear of Americans in Edinburgh and London; but the results of the Paris teaching were being felt, and we were developing rapidly a new generation of practitioners in America. Conspicuous among these were the Philadelphia group. There was WILLIAM GIBSON (1788–1868), born in Maryland, professor of surgery in the University of Maryland in 1812, and in the University of Pennsylvania from 1819 to 1855. He published his "Institutes and Practice of Surgery" in 1824, and the book went to the eighth edition. Gibson was the first to perform ligation of the common iliac (1812); and he operated twice by Cæsarian section.

JOHN RHEA BARTON, born in 1794, was surgeon to the Pennsylvania Hospital. He is known especially

for his work upon bones and joints, and with his name is associated a form of fracture of the lower end of the radius, Barton's bandage for fracture of the jaw, and osteotomy for ankylosis of the knee, first performed by him in 1826. In 1834 he wired a fractured patella. He died in 1871.

GEORGE MCCLELLAN was born in 1796. He was a pupil of Dorsey, Physick's nephew, and was graduated from the University of Pennsylvania in 1819. McClellan will always be known as the founder of the Jefferson Medical College of Philadelphia, in 1824, where he held the chair of surgery until 1838. He was a brilliant operator, bold and confident. He excised the lower jaw in 1823, and the parotid gland; and was one of the first to remove the entire scapula and clavicle for malignant tumor. The clavicle had previously been excised for necrosis, and for the first time, by McCreary of Kentucky, in 1813; while the entire scapula, three fourths of the clavicle, and the arm were excised for the first time, and successfully, by Dixi Crosby of New Hampshire, in 1836. McClellan died in 1847, at the age of fifty-one.

Another distinguished Philadelphian was GEORGE W. NORRIS (1808–1875), a graduate of the University of Pennsylvania in 1830. He was surgeon to the Pennsylvania Hospital and professor of clinical surgery in the university; and his valuable statistical contributions to practical surgery, published between 1828 and 1854, rank him among the best surgical writers of his day.

THOMAS MÜTTER, born in 1811 in Virginia, was

graduated from the University of Pennsylvania and became professor of surgery in the Jefferson Medical College. He is celebrated for his plastic operations for extensive scars. He died in 1859. The Mütter Lecture and the Mütter Museum of the College of Physicians of Philadelphia are notable foundations due to his generosity.

Daniel Brainard was born in western New York in 1812, was graduated from the Jefferson Medical College in 1834, and settled in Chicago. He amputated at the hip joint in 1838, but his most famous service was the founding of Rush Medical College of Chicago.

Other distinguished Philadelphians were Joseph Pancoast (1805–1882), in 1838 elected professor of surgery in the Jefferson Medical College, a strong writer on surgery and distinguished for his plastic operations, resection of nerves, and his work on ununited fractures; Henry H. Smith (1815–1890), professor of surgery in the University of Pennsylvania in 1855; Francis Maury (1840–1879), the first in this country to perform gastrotomy; and D. Hayes Agnew (1818–1892), who taught first in the Philadelphia School of Anatomy,[1] and later became professor of surgery in the University of Pennsylvania. He pub-

[1] This school was founded in 1820 and was a "School of the Prophets" in training future professors in many departments of medicine. It ceased to exist in 1875, having had a longer existence as an extramural teaching institution than any other such school except that of the Hunters in Great Windmill Street, London. A history of the school has recently been reprinted by W. W. Keen in a volume of "Addresses and Other Papers."

lished "Principles and Practice of Surgery" and was for more than a generation a famous and highly esteemed practitioner and teacher.

In New York during this middle period were J. KEARNY ROGERS (1793–1851), an able surgeon of the New York Hospital, and WILLARD PARKER (1800–1884), a Harvard graduate and pupil of John C. Warren. Parker's was a remarkably successful and conspicuous career. He was a teacher in many schools, in Berkshire, Cincinnati, and the College of Physicians and Surgeons in New York. He was a surgeon to Bellevue and the New York hospitals. Billings says that he was the first to operate for strabismus in this country. More than that, though he was not the first surgeon to operate for abscess resulting from appendicitis, his paper in 1867 was the first which compelled the profession to recognize the need for operation.

Bigelow is one of the notable names in American medicine. HENRY J. BIGELOW, of Boston (1816–1890), was the son of a distinguished father, Jacob Bigelow. For more than fifty years the younger Bigelow was eminent. Appointed surgeon to the Massachusetts General Hospital in 1846, and professor of surgery at Harvard in 1849, he served with distinction until his retirement from the hospital in 1886. He was one of the best products of the French school — a brilliant, meteoric teacher, a profound and exhaustive writer, a bold operator. The story of his life is full of interest, but he is known to us to-day mainly for his explanation of hip-joint dislocations — he named the Y-ligament — and for his elaboration of litholapaxy.

Besides these more conspicuous exponents of American surgery, there were appearing here and there men who performed deeds, sporadic deeds, many of them, of which the student of our history should read. BOBBS, of Indianapolis, devised the operation which is known to us to-day as cholecystotomy. He operated first in 1867, forty-one years ago, and removed fifty gall-stones. The next year, 1868, J. MARION SIMS (1813–1883), of New York, operated in the same way and removed sixty stones from the gall bladder. He also introduced the silver-wire suture in operating for vesico-vaginal fistula, and was one of the pioneer gynecologists of America. In 1850 MORRILL WYMAN and HENRY I. BOWDITCH performed the operation of paracentesis thoracis, a great improvement over the familiar old proceeding of Hippocrates. Glancing back nearly to the beginning of the century, we read of BRASHEAR, the pioneer Kentucky surgeon, who first in this country successfully performed primary amputation at the hip joint, a feat which was not repeated until Mott's operation in 1824. GURDON BUCK, of New York, followed Parker in operating for appendicitis; he devised his well-known apparatus also for thigh fractures, in 1851, and excised the olecranon in 1842; while CARNOCHAN, in 1856, excised the second branch of the fifth cranial nerve beyond Meckel's ganglion, for the relief of tic, and in 1853 excised the whole of the ulna.

JOHN L. ATLEE (1799–1885) and his brother, WASHINGTON L. ATLEE (1808–1878), of Pennsylvania, DUNLAP, PEASLEE, KIMBALL, J. MARION SIMS, and

JOHN HOMANS advanced and placed upon a sound basis the operation of ovariotomy.

Such are some of the prominent names which strike one in reviewing the American surgical literature of the middle of the century. The Civil War followed, when the services of these men and their ingenuity were turned to the succor and relief of those wounded in battle. Though the mortality among the troops was high according to modern standards, the surgical record is a brilliant one, and the immense literature of the medical and surgical history of the Civil War deserves careful study.

The last era with which we have to deal is the present era, and is concerned largely with living men. I have called it the German-American era, because it has been influenced enormously by the teachings of the German schools, whither the students of this generation have flocked in multitudes; but it depends also upon American accomplishments and upon work perfected in our own country by men whose initial training was largely German. One conspicuous man, in his day one of the most widely known surgeons in America, was SAMUEL D. GROSS (1805–1884). He belongs to the border-land between the French and the German-American eras. His work for surgical progress was so important, so far-reaching, and so thorough that he merits more than the brief mention we can give him here. Gross was a graduate of the Jefferson Medical College, and began his teaching life in Cincinnati and Louisville, after which he went to New York, and finally was called to the chair of surgery in

SAMUEL D GROSS

the Jefferson School, in 1865, which he held until he retired in 1882. He was a great teacher, a voluminous writer, and a man of the widest acquaintance. He and Bigelow caused American surgery to be respected in Europe, and he had the unique honor of being a laureate of Oxford, Cambridge, and Edinburgh. First of American authorities, he wrote a systematic treatise on pathologic anatomy. He was a publicist with many interests. He was a medical historian. Among his objects of special surgical importance was the investigation of abdominal stab wounds, the excision of the trifacial and spinal accessory nerves, the perfection of a urethrotome, and the study and treatment of tumors.

Samuel D. Gross is one of our few great surgeons who have been suitably honored by posterity. In 1897 the American Surgical Association, with the coöperation of the Alumni of Jefferson Medical College, erected in the city of Washington, to his memory, a handsome statue which stands in front of the Army Medical Museum.[1]

With this brief statement of what Americans have been doing, let us bring to a close, at the beginning of the present era, the story of their achievements. The present era is that which we properly call the era of modern surgery. It began with the introduction of antiseptic methods, and it has nourished and developed some of the greatest men in our surgical history. Many of these men are now living, their work not yet completed. They have contributed enormously to the

[1] *Transactions of the American Surgical Association*, 1897.

advancement of our art in many fields. American accomplishment in abdominal surgery, in neurologic surgery, in genito-urinary surgery, in gynecology, and in the treatment of the eye, the ear, the throat, and the lungs needs no apology. It stands for the best work being done in the world. Let us pass on to a consideration of the famous Englishman to whom our era owes the most, Joseph Lister.

JOSEPH LISTER

BORN 1827

The nineteenth century is immediately behind us. That is a phenomenon we are not likely to forget if the writers shall have their way. Eight years ago we began the present century by celebrating the achievements of the last century, and, truly, the more we inspect those hundred years of progress, the more remarkable they appear. The advances in surgery have been marvelous; to the superficial observer they appear miraculous. In 1894 Billings wrote:[1] "More progress in the art has been made since 1800 than had been made in the two thousand years preceding that date." In 1904 Dennis said: "Surgery as a science made no profound impression upon the world until about a century ago." Such statements are specious, and are true in a special sense only. The achievements of the last century are wonderful indeed, but I have written these pages to little purpose if I have failed to show that the foundations of our art as well as of our science were laid deep long before the beginning of the nineteenth century. Galen is a man to be reckoned with, and Vesalius, Paré, Harvey, and Malpighi, to say nothing of Haller and the Hunters. Such men were needed for the development of Cooper,

[1] Dennis's "System of Surgery," vol. i, p. 91.

Physick, Brodie, Warren, Syme, Paget, Dupuytren, Nélaton, Velpeau, Bigelow, Von Graefe, Von Langenbeck, Billroth, and Lister. The great and permanent achievement in surgery of the nineteenth century was the wide development and establishment of scientific methods of study. Out of those methods have come the marvels which we boast. Without them Morton would not have discovered anæsthesia, nor Lister antisepsis; and Humphry Davy, Jackson, and Pasteur were necessary to Morton and to Lister. History shall determine all this, and shall correct our present perspectives.

All men, to-day, will agree that Joseph Lister is the commanding figure in the surgery of the nineteenth century; and I shall attempt, in the few pages that are left, to tell something of that great man, to place him in his proper setting, and to sum up his achievement. He is still living, but, if he should chance to read these lines, he needs not this evidence that nowhere more than in America is his name revered and his teaching followed.

Thirty-four years elapsed between the death of John Hunter and the birth of Joseph Lister — a brief interval as science reckons time; while between the date of Hunter's last publication and the time of Lister's first studies in the antiseptic treatment of wounds there was an interval of nearly seventy years. It is worth our while to inquire somewhat into the doings of the surgical world during those seventy years. Names attract us first, and there are great names. In Great Britain and in our own America Hunter's pupils and

their pupils carried on his work. During the first quarter of the last century London and Edinburgh were the resorts of students from all countries. There was the brilliant ASTLEY COOPER (1768–1841), whose charm of manner, wide learning, phenomenal skill, and enthusiasm for his profession made him the most popular teacher of his time; JOHN ABERNETHY (1764–1831), Cooper's colleague and rival, thought by many to be more deeply imbued with Hunter's teachings than any of his contemporaries, an able successor and exponent of his master. There also were CLINE, BLIZARD, HOME, LAWRENCE, and WARDROP in the same group. All were sound investigators, teachers, and writers. BENJAMIN COLLINS BRODIE (1783–1862) belonged to a somewhat younger generation. He was a brilliant anatomist and operator, but was noted chiefly as an exhaustless physiologist and a delightful writer. Then there were CHARLES BELL (1778–1842), of Edinburgh and London, whose fame rests mainly on his discovery of the functions of the two roots of the spinal nerves, and his researches into the anatomy of the brain and of expression; PHILIP SYNG PHYSICK (1768–1837), of Philadelphia, a favorite pupil of Hunter, and his prophet in America; and JOHN COLLINS WARREN (1778–1856), of Boston, the first surgeon publicly to employ ether anæsthesia (1846). Coming down farther into the century, there were ROBERT LISTON (1794–1847), of Edinburgh and London, famous for his strength, daring, and weird feats in the amphitheater; JAMES SYME (1799–1870), a renowned teacher in Edinburgh, a copious writer on excision of joints, amputations, and

surgical pathology, and author of a text-book of surgery. He was Lister's father-in-law and the surgeon in "Rab and His Friends." ABRAHAM COLLES (1773–1843), of Dublin, was the first to describe that fracture of the radius which goes by his name; FERGUSSON (1808–1877) was for many years the leading operator in London; ERICHSEN (1818–1890) was the author of one of the best-known text-books which educated thousands of English and American students; while JAMES Y. SIMPSON (1811–1870), by his researches in the domain of both surgery and obstetrics aided to make the Edinburgh school renowned. He is best known to us for his introduction of chloroform as an anæsthetic, in 1847. JAMES PAGET, through his "Lectures on Surgical Pathology" (1853), gave a new impetus to scientific studies left unfinished by John Hunter. Those are a few of the men who made famous Scotch and English surgery. They developed hospitals, reorganized schools, and worked out a masterly technic of the old style. With their limited means, they set a pace which the present generation may regard with profound admiration.

Meantime, on the Continent, new men rose to fame, new schools were established, new centers were developed, and great reputations were achieved. The political conditions which grew out of and succeeded the French Revolution produced strange combinations and brought to the front vigorous and fresh blood, which otherwise might have languished. The wars produced a great line of army surgeons; the problems of transportation, of field and hospital service, of oper-

ative measures, the combating of surgical infections, and the after-treatment of the wounded continually exercised ingenious minds. With enlarged political conditions native talent found encouragement, and monarchs came to see that genius of all sorts must be encouraged if nations are to compete successfully with their rivals. So one finds Napoleon drafting young men into his schools of military surgery, securing for them distinguished instructors, introducing rational anatomy laws, encouraging competition, and fostering science. Vienna, Berlin, and other capitals followed the lead of Paris; medical schools and their associated hospitals became part of the government system; medical education and the license to practice were made matters of vital concern to the State; great research laboratories were instituted, museums and libraries were collected, and facilities such as the world had never yet seen for medical education were provided and made imperative.

Great surgeons grew up under such a system, and their works were commensurate with their pains. At a few such men let us glance. The Paris school and hospitals were the most famous in the second quarter of the nineteenth century. The school, fostered by government, was definitely organized in 1804; in 1806 the Imperial University was created; and in 1808 the medical school became its faculty of medicine. Dominique Jean Larrey (1766–1842) was Napoleon's great army surgeon. You shall read with delight his "Memoirs of Military Medicine," a mine of information. He appreciated the value of surgical rest, and relates

scores of remarkable and instructive cases. He lived for years as the beloved Nestor of the profession. GUILLAUME DUPUYTREN (1778–1835) was surgeon-in-chief to the Hôtel Dieu, from 1815. He was a bold, self-reliant, stern, unpopular man, a physiologist and pathologist, and for years a great power in the world of surgery. JACQUES LISFRANC (1790–1847) is famous for his amputation of the foot; he was a past master in all sorts of amputations, and was known also for his excisions of the jaw, the rectum, and the cervix uteri. JEAN CIVIALE (1792–1867) made his mark as a great genito-urinary surgeon. ALFRED ARMAND LOUIS MARIE VELPEAU (1795–1867), surgeon to La Pitié and professor of clinical surgery in the faculty, after 1833, was a strong, resourceful, and useful man, a thorough anatomist and an able operator. He was a great worker and a splendid teacher — perhaps the most valuable surgical member of the French school in the first half of the last century.

JOSEPH FRANCOIS MALGAIGNE (1806–1865) is the greatest surgical critic and historian known to us. As a speaker and publicist he will endure, but his work as a practical surgeon is ephemeral. AUGUSTE NÉLATON (1807–1873) is thought by many to be the best surgeon who has yet appeared in France — diagnostician, operator, teacher. He published "Elements of Surgical Pathology" in five volumes.

So much for a few of that famous French school upon which one fain would linger. It is hard to pass by such names, but so, too, with a few Italians and many Germans. There was the great surgeon and

Bernhard R. K. von Langenbeck

anatomist, ANTONIUS SCARPA (1752–1832), of Modena and Padua — he of Scarpa's triangle; VINCENZ SEBASTIAN VON KERN (1760–1829), the great Viennese surgeon from 1805 to 1824; and PHILIP FRANZ VON WALTHER (1782–1849), professor of surgery at Munich after 1830, the founder of modern surgery in Bavaria. CARL FERDINAND VON GRAEFE (1787–1840) from 1810 was the distinguished first professor of surgery at the newly established University of Berlin. JOHANN FRIEDRICH DIEFFENBACH (1792–1847) succeeded Von Graefe at Berlin in 1840; a strong and ingenious operating surgeon, he is known to us especially as the originator of the operation of tenotomy for strabismus. MAXIMILIAN JOSEPH VON CHELIUS (1794–1876) wrote a delightful and valuable "Handbook of Surgery," which had a wide influence. He was professor of surgery at Heidelberg.

The most eminent German surgeon of the last century was BERNHARD RUDOLPH KONRAD VON LANGENBECK (1810–1887), the Astley Cooper of Germany. Von Langenbeck succeeded Dieffenbach in the chair of surgery at Berlin in 1847, and for forty years was a power in the land. He devised numerous operations, made countless improvements in technic, and established two important journals of surgery; but, as Billings says, his greatest contribution to surgery has been his pupils. Passing over Zeis, Stilling, Heine, Loeffler, Lücke, Hueter, Maas, Vogt, Volkmann, we must recall especially THEODOR BILLROTH (1829–1894), the famous professor of Vienna after 1867. He was a pupil of Von Langenbeck and was almost equally remarkable. A many-sided man, interested in and

concerned with every new thing, he was a daring and original operator and an inspiring teacher. He excised the larynx in 1873 and the stomach in 1881. Dozens of American surgeons, now active, studied under him, and his name is a household word among us.

We have seen that the two great surgical events of the last century were the discovery of anæsthesia and the development of antisepsis. In a measure the two go together. Either would be less effective lacking the other. Lister was a student in University College, London, when ether anæsthesia was demonstrated in Boston; and though he had not yet begun his medical studies, the fame of the discovery, if not the enthusiasm for it of Liston, who, first of English surgeons, used ether in the North London Hospital, must have stirred Lister's youthful mind.

Joseph Lister was born on April 5, 1827, at Upton, in Essex County, England. He is not a Scotchman, as many think, though his notable work was done in Scotch universities. His biography has not yet been published, so that material for a sketch of Lister's career is scanty and scattered. Six years ago (1902) there was the Lister Jubilee, to commemorate his fifty years of professional life. English medical journals celebrated the event in articles furnished by some of his old friends and pupils. From such sources and from the writings of the man himself one may construct a broken story. As the *British Medical Journal* says, its contributors "have related the biography of a scientific thesis rather than of the man who established it."

Lister's father was Joseph Jackson Lister and his mother was Isabella, daughter of Anthony Harris, of Maryport, Cumberland. The elder Listers were Quakers. The mother died in 1864 and the father in 1869. Joseph Jackson Lister, following his own father's trade, was a wine merchant in London, but in spite of the claims of business, he was through life an earnest student of science. He made important improvements in the microscope, and in the year that saw the birth of his distinguished son he published, with Thomas Hodgkin, a paper entitled "Some Microscopical Observations of the Blood and Animal Tissues." His son wrote a life of him for the "Dictionary of National Biography," from which it appears that the senior Lister was a useful and constant contributor to the construction of the microscope and to microscopic studies. In 1834 he became a Fellow of the Royal Society.

Joseph Lister was carefully educated for his profession. He went to a private school, as a lad, and then to University College, whence he was graduated B.A. in 1847. In that same year, at the age of twenty, he began the study of medicine, which he followed zealously for five years in the medical faculty of University College and at University College Hospital. During this course he was greatly influenced by Graham, professor of chemistry, and Sharpey, professor of physiology — strong and inspiring men. His father's influence with him was important, too, in those years, so that we hear of the young man's devoting himself early to histologic research. His first published paper,

written in 1852, deals with the existence in the iris of tissue identical with ordinary unstriped muscle, and with its distribution. In 1853 he produced "Observations on the Muscular Tissue of the Skin." Meantime, in 1852, he had been graduated M.B., and had become a member of the Royal College of Surgeons. In the hospital Lister served as dresser and house surgeon to J. E. Erichsen; his own house surgeon and senior while he was in the former office being Henry Thompson. Of those early years we know little as yet, though we must believe they were fruitful years; for what years of Lister's busy life have failed of accomplishment?

On leaving the hospital he followed the advice of Sharpey and Thompson, and went to Edinburgh. Sharpey told him to take six weeks of Syme's clinic. Now, Syme had gone up to London to be a surgeon to the University College Hospital, in 1848, for a few months after Liston's death. So Lister went to Scotland for six weeks, and in Scotland he worked and taught for twenty-three years. He went to Scotland an obscure student; he returned to England one of the lights of the surgical world.

One may divide geographically the progress of Lister's career: A youthful period in Edinburgh, from 1854 to 1860; professor of surgery in Glasgow, from 1860 to 1869; professor of clinical surgery in Edinburgh, from 1869 to 1877; professor of clinical surgery in King's College, London, from 1877 to 1893, when, at the age of sixty-six, he retired from active teaching and was made emeritus professor of clinical surgery and consulting surgeon to the hospital.

Dr. Theodor Billroth

At the time of Lister's going to Edinburgh the frightful mortality of troops in the Crimean War was exercising men. Soldiers were being killed in battle by tens and hundreds, but they were dying of surgical diseases by thousands. The newly aroused science of Europe was keenly aware of these facts, and in the great hospitals surgeons groped after causes and remedies, fruitlessly for the most part. Indeed, a sort of fatalism appeared to be settling upon the profession. That hopeless view seems never to have subdued Lister. Sir Hector C. Cameron writes that "the grief and mental worry arising from such experiences, often repeated, produced in Lister's mind a sense of discontent with things as they were, and this seemed to many of us who were his pupils in strange contrast to the resignation with which some of his colleagues viewed similar experiences."

One cannot say just when it was that Lister began constantly turning his mind to the problem of a remedy for wound infection. Perhaps he himself could not tell us now, but he must have been dwelling upon such things very early in his career. We may conceive of the condition in those old hospitals, and of wounds in general, from the descriptions in the books and from the tales of men whose professional memories go back thirty-five years or more. In the hospitals surgical sepsis ran rampant. Secondary hemorrhage, erysipelas, septicemia, pyemia, and "hospital gangrene" were endemic. Sometimes wards, wings, or whole institutions were closed, in vain attempts to stamp out these disorders. Operations in private houses, especially in

the country, were less dangerous than in hospitals, but even in private practice the mortality from sepsis was high. Sometimes a surgeon would wear the same old operating coat for years, and would pick waxed ligatures from the buttonhole of his assistant, who carried them there for the convenience of his chief. Old hands will tell you such stories by the score. To the modern surgeon it is a barbarous era.

In Edinburgh Lister acted for a time as resident surgeon to Syme at the Royal Infirmary, and in 1856 became assistant surgeon to the same distinguished man. Syme was a brilliant and resourceful operator, and the admiration and affection between the two men was constant and abiding. Lister married Syme's daughter. Annandale tells how in the early days Syme often spoke to him of his appreciation of and pride in Lister's original scientific spirit and work, and his belief that such work would result in an important advancement of surgical practice. So far as one may judge, Lister has won through life golden opinions from those with whom he has come in contact. In his early days his colleagues admired him and his pupils accepted him with whole-hearted enthusiasm, even while the outside world heard him with a shrug or opposed him with vigorous incredulity. Lister's temperament and method were very different from those of John Hunter. He was never contemptuous, loud, or bellicose, but out of thorough study and careful observation drew conclusions which he put persuasively and persistently before the surgical world. The surgical world was forced reluctantly to accept them.

While in Edinburgh, besides assisting Syme, Lister gave admirable courses of systematic lectures on surgery, and carried out numerous original investigations, notably on the coagulation of the blood. One must remember that he is a practical surgeon as well as a laboratory student; in his active days he was an ingenious and able operator, as became the pupil of Syme, and for the greater part of his life he has been a professor of clinical surgery. He remained in Edinburgh in this early time until 1860, his thirty-fourth year, and it was during the last of this period that he began his bacteriologic studies in connection with antiseptic surgery. With an eye single to this great problem he kept a lookout for what the rest of the world was doing, and it was now that the significant researches of Pasteur attracted him. It is well for us, too, to take note of the great Frenchman and of his service to surgery.

Louis Pasteur was five years Lister's senior. The son of an old Peninsular veteran, he was well educated for a scientific career, and was a pupil of Dumas, the famous chemist.[1] The story of his studies in fermentation and spontaneous generation is a classic of scientific literature. By 1860 he had convinced himself of the importance of the rôle played by microbes in the production of fermentation, as opposed to the old view of Liebig, that it is a "change in organic fluids and tissues set in motion by the access of oxygen or of bodies in a state of decomposition." After the demon-

[1] Read Vallery-Radot's "Life of Pasteur," one of the most delightful and stimulating of biographies.

stration of the cause of fermentation, there followed experiments and discussions on spontaneous generation and the establishment of Pasteur's thesis of the non-existence of such generation.

These two great facts being admitted, what was their bearing upon putrefaction and wound infection? Vallery-Radot tells an anecdote of Pasteur's interview with Napoleon III in 1863, when the emperor questioned Pasteur closely on his studies and conclusions. The next day Pasteur wrote: "I assured the emperor that all my ambition was to arrive at the knowledge of the causes of putrid and contagious diseases."

This is not a history of bacteriology, but we are dangerously near that fascinating topic. Suffice it to say that in Scotland Lister's growing belief in an external agent as the cause of wound infections was strengthened and confirmed by Pasteur's researches, for in 1867 he was able to write: "Turning now to the question how the atmosphere produces decomposition of organic substances, we find that a flood of light has been thrown upon this most important subject by the philosophic researches of M. Pasteur, who has demonstrated by thoroughly convincing evidence that it is not to its oxygen or to any of its gaseous constituents that the air owes this property, but to minute particles suspended in it."

In 1860 Lister had achieved so enviable a reputation in Edinburgh as a brilliant and sound teacher and judicious operating surgeon that he was called to the professorship of surgery in the University of Glasgow. The next year he was made a surgeon to the Royal

Infirmary there. In both offices he met with gratifying success, and, as one would expect, he continued to devote himself, in this broader field, to the problem of antiseptics. He believed then and for many years afterward that the air was the vehicle which brought poison to wounds, though he recognized then and with increasing perception as the years passed that all foreign substances —clothing, skin, instruments, sponges, ligatures — were also contagion carriers. Even before finding a satisfactory antiseptic he insisted that operators and dressers should be scrupulously clean, and he employed sundry deodorant lotions about wounds. He had not then concluded that putrefaction and suppuration are distinct processes and are due to distinct cause . He regarded wound infection as putrefaction; and what wonder, considering that putrefaction did frequently occur, and simulated inflammations of the most virulent type? The science of bacteriology was in its infancy, and no one appreciated the different forms of organisms, much less the distinction between pathogenic, pyogenic, and saprophytic bacteria.

Whatever the active and offending agents might be, Pasteur's teaching confirmed Lister's opinion that they were omnipresent, and he sought an antidote. So he was led to his famous carbolic acid,[1] an agent little known then in Great Britain. He had been impressed by the action of carbolic acid employed in disinfecting the sewage of the town of Carlisle, where it had

[1] Küchenmeister, of Dresden, had reported good results from carbolic acid in 1860, and Lemaire's work on carbolic acid (which was then known as "acide phénique") was published in 1865.

deodorized pastures and destroyed parasites which were said to infect cattle.

At that time Lister's ingenuity was exercised especially to save cases of compound fracture, in which the mortality had always been great, and it was in such cases, in 1864, that he proposed to use his new remedy. He recognized that the most severely lacerating *simple* fractures healed without special disturbance, and convinced as he was that it is the air admitted to *compound* fractures which renders them dangerous, he sought to reduce them to the *simple* state by excluding air, or by opposing to the air a barrier which should render harmless its offending germs. Accordingly he wiped out the wound with pure carbolic acid and then sealed it with lint soaked in carbolic. The exudations, mingling with the acid, formed a paste which soon hardened into a firm scab. In order to prevent too rapid evaporation of the agent he laid over this dressing a block-tin shield. So long as active inflammation did not appear, the carbolic scab was painted daily with more carbolic to keep in force a fresh supply of the germicide, and the shield was reapplied daily. The surprising success of this treatment in the case of compound fractures led to its employment in abscesses and in fresh wounds. Sometimes it was impossible to secure exudate of proper quality to mix with the carbolic for a paste, so an artificial paste of linseed oil, carbonate of lime, and carbolic acid was devised. This was Lister's famous "antiseptic putty."

In such fashion the work progressed during those nine Glasgow years. The antiseptic principle was

gradually extended to all varieties of surgical lesions, to septic processes, to fresh accidental wounds, and to operation wounds — amputations, excisions, and their like. As yet the treatment was crude, and consisted merely in modifying and extending the carbolic acid applications. Says Cameron: "It only remains to be added that the effects of the new treatment upon the wards were in the highest degree beneficial, converting them from some of the most unhealthy in the kingdom into models of healthiness."

Syme retired from the chair of clinical surgery at Edinburgh in 1869, and Lister was called from Glasgow to take the vacant place. By this time the new treatment had been well advertised through the lectures, papers, and addresses of its author, and the world was beginning to listen, but with an indulgent smile. As Chiene says: "Lister devoted his introductory (Edinburgh) lecture to 'an endeavor to convince' his hearers of 'the truth of the germ theory of putrefaction,' 'the basis of a new method of treatment,' 'the antiseptic system.'" [1] These views were new to most of his listeners, and were heard with many questionings, but he continued to expound, to practice, and to demonstrate so effectively that when he left Edinburgh, eight years later, his theories had been received there, and his precepts were followed in some fashion.

Lister's second residence in Edinburgh marks a service of continued development. Pasteur and himself, as well as other students, were advancing along

[1] In his Liverpool address before the British Association, 1896, Lister told simply the story of modern surgery and of his part in it.

lines which meant a constant expansion of bacteriology and the intelligent application of its principles to the problem of sepsis and wound healing. The Franco-Prussian War of 1870 had its lessons for French and German surgeons; scourges raged through the armies, though such men as Volkmann, Von Esmarch, and others were beginning to employ simplified measures and a more rational therapeutics. The voice of Lister was finding its echo even on the battlefield. At home the modest great man was gaining strength continually. A writer in the *British Medical Journal* tells of the feeling akin to awe with which the younger medical generation of those days saw Lister, in defiance of tradition and authority, but secure in the certainty of scientific truth, do many things which at that time were condemned by professional opinion as most dangerous procedures.[1]

In 1877 Lister made his final move to London, where he was called to the chair of clinical surgery in King's College. He went reluctantly, for he was fifty years old and had long been doing congenial tasks among friends; but the new field was wide, the audience great, and the urging strong.

We may not follow the detail of his subsequent career or the growth of his work. Suffice it that time brought important modifications in his practice but not in his theory. Particular antiseptics came and went; the carbolic spray was used and was banished. Air was found to be not a dreaded enemy and carrier of disease, but a kindly friend when properly entreated;

[1] *British Medical Journal*, vol. for 1902, p. 1856.

surgical cleanliness, a germ-free environment, became recognized as the one thing needed. Heat, soap and water, the nailbrush, alcohol, and a few simple chemicals took their place in our armamentarium, and *asepsis* supplanted *antisepsis*. But the great underlying truth remained: that wound infection comes from without the wound, that it flourishes under appropriate conditions, that it may be eliminated by appropriate measures.

Twenty-five years ago Lister had won his victory, and saw his principles adopted throughout the surgical world. Who may tell the effect of that victory on surgical progress? No man has reckoned the immeasurable saving of life, the uncomputable relief of suffering, the opening of new surgical fields. Daring has become conservatism; rashness has become common sense. The cranial cavity, the thorax, the abdomen, the lungs, the heart, the intestines, joints, the ear, the eye, regions and organs which were once sacred to the action of disease, which were inspected on the post-mortem table only, are now opened freely to the renovating measures of the surgeon and to the gaze of every medical student.

Eloquent volumes have been written to celebrate these great themes; this feeble pen can but trace its eulogy in humble echo.

Lister, the man and scientist, has been rewarded in a manner, so far as our human rewards may express gratitude. The list of his honors and degrees would fill more than one of these pages. He is a member of all sorts of learned bodies at home and abroad;

Oxford, Edinburgh, Dublin, Glasgow, Cambridge, Toronto, have loaded him with their highest diplomas; portraits of him hang in distinguished halls where they fix the eyes of the world's great ones; he has presided over august assemblies; Queen Victoria made him a baronet in 1883, and in 1897 he was raised to the peerage, with the title Baron Lister — the first and only representative of the medical profession to be so honored in Great Britain.

How shall one sum up and estimate what he represents? Writers are wont to describe surgeons as great for their knowledge, their multitude of patients, their writing of books, their popularity as teachers. A lower estimate is to count him the great surgeon who is a great handicraftsman. But who shall be numbered with the immortals? We know that mere mechanical facility in surgery is not enough. It is permanent contribution to knowledge which counts. The uninformed look to closet students for such contributions, but have we not seen great operators who were great contributors? Mere operators are not known to history. Even the typical clinical surgeon, Paré, is memorable to most men for his invention of the ligature only. In our own time and in America the question of the appendix has agitated men. Surgeons have reported their hundreds of appendectomies amid the winding of horns and screams from the gallery gods, but the prize lies with that modest scientist [1] who, twenty years ago, gave to the world a single paper, in which he described the significance of the appendix and its rôle in disease.

[1] Reginald Heber Fitz.

Three years ago only was he rewarded with the LL.D. by his Alma Mater.

And so with Lister; thoroughly educated to use the tools of his trade, profoundly versed in the science of his time, he spent his youth in acquiring and perfecting himself in what the world already knew of surgery. In his prime a skillful operator because operating was part of his business, an accomplished clinician because clinical surgery was his forte, he appreciated that the greatest work in science is creative work. His genius grasped at a breathless possibility, never before conceived by conservative minds; and so, following those sound inductive methods known to science through the ages, he launched us upon an era which is truly the most brilliant in the history of surgery.

TEACHINGS OF THE OLD SURGEONS[1]

On the Continent and in England many men read the old masters, and in our own country their writings are known to not a few.

Recently a new impulse has been given to such studies by the publication in Paris of Nicaine's editions of the works of Guy de Chauliac and Henri de Mondeville.

The latter, born in the thirteenth century, composed his Surgery about 1310. He was surgeon to Philip the Fair and Louis X. He was exposed to the obloquy so commonly poured out on reformers in those days. His great heresy consisted in his adherence to the familiar teaching *vis medicatrix naturæ*. His work for six hundred years was disregarded.

De Chauliac died an old man in 1365. His work, composed in his later years, remained for two centuries a great text-book of surgery.

The thought of the rational studies of those two men, working on lines centuries in advance of their contemporaries, furnishes me with a text for this essay.

One seldom goes to a large general medical meeting, attends a medical dinner, or listens to a formal professional speech without being told, by the orator, of the wonderful recent advances in surgical science, of the ignorance of our fathers, of the brilliancy of ourselves;

[1] From the *Boston Medical and Surgical Journal*, October 3, 1895.

so that one would almost think, as many do think, that surgery is a modern science.

W. Watson Cheyne, in his chapter on "The History of Antiseptic Surgery," says that all the old surgeons were governed by one thought — the desire to *make* the wound heal, as they said; and that the feeling was universal that wounds left to themselves went to the bad. That is not true, as I read the old writers. It is the error which the best of them constantly were preaching against. To be sure, their voices may have been lifted in the wilderness, and doubtless the practice of the times was often bad among the rank and file; but this is true of all ages. "Give nature a chance," "Leave more to nature," was frequently said. Paul of Ægina, even in the seventh century, taught it, and Rogerius in the thirteenth. So did Bouve about the same time, and later De Vigo and Paracelsus. That most entertaining writer, Le Dran, in the second quarter of the eighteenth century, taught his Parisian students to assist nature and not to thwart her; and Napoleon's great surgeon, Baron Larrey, taught to close a simple wound and leave it to nature for a first intention, as even the savages knew that.

We do better now than that, to be sure. We guard nature without interfering with her — at least, that is our effort; but one is sometimes inclined to think that our asepsis accomplished, we care for little else. Surgical rest, comfort, and support are almost equally important; discomfort and pain are still serious complications. They used to be danger signals. They must be thought so still.

Not only did Larrey teach local but general support, the sustaining of the general strength, a stimulating and nourishing diet. We are apt to think that those surgeons confined themselves to bleeding and purging. So far was Larrey from this that he was fertile in devices for forced feeding. The stomach tube was in common use; and when that would not serve, he advised a soft-rubber catheter passed through the nose and well down into the esophagus. He remarks that this method is especially valuable with hysterical patients and those whose fauces are paralyzed. His contemporary, Benjamin Bell, in 1804, said that with patients exhausted by suppuration a full diet, supplemented by an abundance of alcohol, was absolutely needful. The danger of superficiality was keenly appreciated by such men; and Bell says: "Accordingly, in different hospitals we daily meet with good operators, but we do not often find surgeons possessed of that knowledge in the prognosis of chirurgical diseases which might be expected, that attention being seldom bestowed which is necessary to attain it." Indeed, Bell thought that his success was more largely due to his prescribing wine, food, and Peruvian bark than to his operative skill. This use of wine and spirits with alcoholic subjects was especially urged by Sir Astley Cooper, who may be considered almost a modern. He said: "When a drunkard is injured, don't cut off his rum too soon; it keeps up his strength and acts as an antidote to the infective poison of the wound." Indeed, Sir Astley, in making his prognosis as regards sepsis, laid more stress on the patient's general condition than do we

ordinarily. He most emphatically recognized that, whatever the immediate cause might be, a patient in wretched general condition offers a better field for a rapid septic infection, whether from traumatism or any other cause, than does a person in robust health. It is interesting that his exception to this general rule is in the case of an "acute peritonitis, so severe and commonly fatal in vigorous young men." This parallels our own experience with rapidly fatal appendicitis.

The grand principle in the cure of disease, says he, is that all the secretions must be restored. "If the bowels, the kidneys, and the sweat glands are working, the poison will be eliminated and the patient recover." Though we seek our object by other methods and for better understood cause, this maxim is the same with us to-day.

Emotional causes of disease were greatly considered one hundred years ago. White's recent suggestive article on the "Operation, *per se*" recalls many of the experiences of Sir Astley, who had no doubt that general conditions and mental impressions entered more largely into surgical therapeutics than was or is believed.

Even for those in health he preached a carefully regulated life, and says that in his own case he always employed temperance, early rising and cold morning baths, for the cold bath is especially valuable in an increased irritability of the nervous system; and Benjamin Bell says that in persons afflicted with chilblains or tuberculous tumors "the only good is from cold bathing and tonics."

"There are few satisfactions greater than being

satisfied with one's personal appearance," says Sir Astley, and tells of "a drawing master with bow shins; a deformity which he considered so grievous as seriously to interfere with his vocation. He applied to many surgeons to relieve him, but without success. Finally, a heartless quack consented to operate. He laid open the calf, and scraped away the outer side of the tibia until there was little left but the inner shell. The operation was done successively on either shin, and the leg then straightened by an outside splint. The patient was rendered a cripple for life, and the operator was nearly hounded out of town; but," says Sir Astley, "extraordinary as it may seem, the drawing master was perfectly satisfied with his new appearance and returned complacently to his occupation."

Hygiene and proper surroundings for surgery were early recognized as important; and the comparison between hospital surgery and surgery done in the country was as commonly made in the old days as it is with us. We are all familiar with the assertion of our country brother that he never sees puerperal fever and that his operation wounds usually heal by first intention. These statements doubtless are in some measure perfectly true, and the reason for this state of affairs is sufficiently obvious. We in the city hospitals are constantly at war with the bacillus. Our predecessors often abandoned the field and carried their operations into the country.

The explanation of septic fever given by old writers is interesting; and some of them came exasperatingly near the truth. Writing at the end of the eighteenth

century, one says: "Septic fevers are due to the sympathetic action of the nervous system. When a part is injured, nature contends for a cure by stopping the functions of all the uninjured organs and thus, turning aside their blood supply to the injured part, setting up inflammation and so attempting cure. Sometimes, alas, she is too hasty."

Sir Astley Cooper constantly invoked the action of the sympathetic nervous system to explain various phenomena, stating, for instance, that slight blows on the stomach causing death were due to irritation of the semilunar ganglion, and that urethral and bladder operations were dangerous from the same cause. He says elsewhere: "Do not do lithotomy on a child under two years of age, if avoidable, or you will see convulsions and death."

In our own day, perhaps, we are not altogether free from some needless fears of that same nervous system, or of bogies cloaked in other names and called *diatheses;* but whether those seniors of ours attributed acute general infections to the electric action of the nerves or not, they were prompt to recognize danger and to use fairly rational means in combating it.

Their recognition of the causes of nerve storms and neuralgias were frequently inaccurate, of course; but it is interesting to see them using as nerve tonics our modern favorites, arsenic, iron, and quinine.

The study of the development of wound dressings is a fascinating one, and the astonishing guesses at both antisepsis and asepsis fill surgical literature. The fact that they were guesses and not rational deduc-

tions alone lost them their proper place, though certain varieties of deodorizers and mild antiseptic oils and balsams have been favorites from time immemorial. The old Hebrew writers and the mediæval monks speak of sweet-smelling spices, and we are told that the Good Samaritan dressed the wounds of the stranger by pouring in oil and wine. Doubtless, Rebecca so brought the wounded Ivanhoe back to health, to judge from Sir Walter's somewhat florid description of that episode.

The routine practice of closing and dressing wounds, with the object of attaining a primary union, is much more modern, however; and the development of that practice came slowly. Attempts were made, indeed, as early as the end of the fifteenth century, when De Vigo taught to close fresh incised wounds and drain with lint.

Another of our old friends, Philippe Auréole Théophraste Paracelse Bombast, who was born in 1493, a date easily remembered in connection with a certain affair at Chicago, two years ago, used silver sutures and lead washes. In our own day we find Sampson Gamgee a strong advocate of these same silver sutures and for the same reason, that they are unirritating and less likely to cause suppuration.

Paracelsus aimed only at aiding nature, and sought a medicament that would prevent corruption. After him many surgeons, Ambroise Paré, Delacroix, Fallopius, and others, used antiseptic washes, mostly alcohols.

Magatus and Paré, in the sixteenth century, insisted upon infrequent dressings, anticipating the com-

mon practice of to-day. Watson Cheyne, in 1882, made the somewhat surprising assertion, that "these infrequent dressings, owing to the fear of bad effects from the contact of air with the wound, were, as we now know, the outcome of a wrong theory," and the error of such teaching eventually did great harm to Magatus's many good points.

Richard Wiseman and Sir John Coldbatch were most judicious among the English surgeons. The latter appears to have had some remarkable results from the use of a process of his own, which is not given, but which seems to have closely resembled Listerian methods. He put a powder into water, and with the mixture syringed out the wounds, covering them with pads wrung out of the same preparation. The method was evidently empirical, for he remarks casually that if water was not convenient he would take urine. Unfortunately, Coldbatch's method seems to have been lost; it is suggested that his powder was probably boric or salicylic acid.

After all, the balsams always retained their favor. In 1730 Le Dran, in seeking primary union, covered the wound with a linen rag dipped in some glutinous balsam, Canadian or Peruvian, to prevent putrefaction. He adds the elegant and cosmetic suggestion, that in dressing the perineum one should use oil of roses and that the deeper parts should be steeped in brandy. Later, the wound should be dressed simply with dry lint.

Baron Larrey used balsams, wine, and brandy; and washed the wounds with a warm salt solution; when

there was extensive suppuration and sloughing, applications of chlorinated soda, known as *Eau de Labarraque*. His favorite application was the well-known storax, which under its modified form of styrone is now so popular with many surgeons. Such preparations were always called antiseptic substances, and Benjamin Bell especially urges their use in gangrenes and ulcers.

The possibility of a "second intention," a union between clean granulating surfaces after a thorough antiseptic bath, was often taught by the same writer, who says: "It is a mistake to suppose that wounds will not adhere when in a state of bland purulency. I have repeatedly treated with sutures sores of from one to four weeks' standing, and for such intentions a dry lint dressing is all-sufficient." Moreover, for suppurating inflammations we must use hot poultices, but for granulating wounds a bland ointment is all-sufficient; and when the pain, inflammation, and primary fever are over in open wounds, poultices should no longer be used. Then employ lint, backed with a tow bolster to keep up firm and even compression. If poultices are needed still, warm immersions in salt water or fresh milk are most useful to supplement them. Dress simple wounds seldom and with mild aperients.

Sir Astley Cooper had an interesting faculty for seizing upon drugs destined to become famous. Among others he mentions bichloride of mercury, which he commonly used as a wash for ulcers and sinuses — an excellent application, on account of its cleansing and stimulating properties.

The practice of getting wounds clean was an early one in surgical science: innumerable devices were tried — washes, ointments, stimulants, and caustics. The more modern idea of irrigation did not become well established until the present century. Copious libations of cool water were taught first by Percy and Lombard in 1785, and had long been the common practice among English surgeons at the beginning of the Listerian era. How far the idea that wounds must be abundantly flushed has affected our own practice we know but too well. For many surgeons even now feel that their operation is incomplete until the clean, fresh wound is drowned in floods of corrosive sublimate or carbolic acid.

In the treatment of deep suppurations by drainage we have improved but little on the best practice of one hundred years ago. Benjamin Bell always used hollow drainage tubes in deep wounds and sinuses when pus was to be evacuated; "nor tents," he adds, "which do not absorb and serve to block the discharge." He would doubtless have objected, on the same ground, to the plugging of suppurating sinuses with iodoform gauze, a common misuse of a valuable agent to-day. Le Dran says: "The only cure for empyema is to operate and drain with a catheter. If the amount is great, don't drain it all off at once on account of faintness and suspended dilatation of the lungs."

The agency of the air in causing suppuration was an endless subject of discussion even down to our own time, and many experiments were undertaken to prove or disprove its harmfulness. Sir Astley Cooper con-

vinced himself that air did no harm, from the experience of an ingenious and heroic butcher. This person was drawn to serve in the militia. Hearing that a hernia disqualified a man for service, the butcher inserted a long tin tube beneath the skin of his scrotum, and having blown it up, presented himself to the examining surgeon with the statement that he had always been ruptured. After a cursory examination he was discharged. The false hernia disappeared after a few days, and the man was never the worse for his trick.

Though Sir Astley came largely to disregard the entrance of air into wounds, most of his contemporaries still feared it. For many years, even back to the time of Paré, some surgeons had taught that it was the miasms in the air and not the air itself which did harm; yet one hundred years ago the fear of air as air was rife among men, and they went about seeking how they might exclude it. The use of the spray in our own days shows that this fear died hard. Benjamin Bell, John Bell, Hugh Monro, Alexander Monro, James Latta, Abernethy, Percival Pott, John Hunter, and many other worthies hated and dreaded this same air for one cause or another. Some of them, as Guyot, put wounded members into hot-air boxes and kept them there. Here was a sort of mild asepsis, not fifty years ago. Others, like Dupuytren, operated subcutaneously as much as possible and so got some unexpectedly good results. The vast majority, therefore, were convinced that there was something deleterious in air, and even after operating, still attempted its exclusion.

They painted wounds with tincture of iodine in 1830, and covered them with collodion in 1848—this was first used in America. They would always pour in their oil or wine or water. It is a wonder they did not operate *in vacuo;* indeed, a vacuum-box dressing was tried in Paris, but availed nothing.

All this sounds something like a blind groping in the dark, but there were other cases in which sound rules were laid down and followed. When an evil was accepted, when inflammation and pus did appear, the treatment was often most logical.

When wounds were sewed up and strapped, drainage was provided; for Le Dran used strapping, constantly leaving loose spaces, through which drainage was easy. But, he insisted: "If you do want a first intention, which is most common, an assistant must absolutely approximate the edges; don't pucker or invert, else you will have sloughing and non-adhesion. If you sew up, tie your knots at the least dependent part, so they will not imbibe blood and harden; if you choose, oil them;" not a bad thought for delicate cosmetic work on the face and neck.

So the methods of threading needles, passing and tying sutures, and the thousand and one minutiæ which are now left for the assistant were then thought not unworthy of the surgeon, and essentials in his success. The use of double-headed sutures was popular two hundred years ago, for use in all deep wounds as well as in the abdomen. The flaps were most beautifully and accurately approximated, and in the very fastenings of the swathe the pins were so arranged as

not to incommode or press upon the line of the scar. In sewing up these deep wounds Le Dran tells his pupils that the lower angle should always be left open so that the wholesome but superabundant juices of the wound may exude, and pressure and pain be avoided even should there be no formation of pus. The drainage is to be secured by passing in a number of strands of ligature silk.

Similar use of capillary drainage, — I think I am not mistaken in having heard it claimed as a modern invention, — such use of capillary drainage is strongly urged by Benjamin Bell also, who drained liver abscesses even, after operation, by long loose strands of lint wicking. And three hundred years earlier De Vigo had closed wounds and drained with wicks.

Most of all did the older surgeons pay attention to open wounds, ulcers and burns, which were granulating. For the immediate ease of the pain from a burn they would commonly plunge the part into salt water or a soda solution. We, to-day, know the immense comfort of a warm soda bath for the badly burned.

We find our modern successful use of "strapping" for leg ulcers advocated by Sir Astley Cooper, to flatten the granulations and support the sore. He was wont to use, also, sheet lead and tin dressings in such cases. When the offending veins were especially full, he would tap them once or twice weekly and apply a corrosive-sublimate wash, a hundred years ago. Then the whole leg was to be carefully put up in a supporting flannel bandage, changed daily.

I cannot see that we have much to teach Sir Astley

here, and I daresay he might have taught us a good deal.

Favorite preparations in the last century were those of Goulard. They contained lead, and were used in the form of ointments, cerates, and lotions, as applications to sluggishly granulating wounds.

Another careful suggestion, showing thought for the preservation of function, was this: that in a deep wound, say on the front of the thigh, in which the muscles were divided obliquely, the deep stitches should be passed so as to run parallel with the muscle fibers and not obliquely, as would be natural in sewing up an incised wound. Le Dran claims that by so doing the power of the limb will be unimpaired. Stitches so taken, when there was the slightest strain, were always to be supported by plaster, which should reach to the neighboring joints on either side. Another device for securing absolute approximation — a device commonly neglected to-day — was the passing of sutures with a curved needle entirely beneath the depth of the wound. In many such cases, especially when incised wounds were received on the battlefield, one reads that first intentions were the rule, and that the stitches could be removed on the sixth day. To attain this it was thought essential to have a perfectly dry wound before sewing up; so after securing the vessels by torsion or tying with fine silk, a pledget of dry lint was pressed for some minutes upon the oozing surface. It was well understood that a dry absorbent material was the best hemostatic. This was one hundred and fifty years ago. We have within

five years rediscovered the advantages of what it pleases us to call operating by the dry method.[1]

Though sutures were extensively used, their employment was always attended by a very wholesome fear of stitch abscesses; and one finds the advice constantly given: "Never use sutures when a bandage will do." The pressure of the stitches was thought to be the cause of danger. Plaster and strapping were also extensively employed where we should never think of their use. Even when stitches were used, however, the impending inflammation was averted frequently by the use of massage, which, sometimes supplemented by opiates and leeching, would quiet the wound without the necessity of removing the stitches.

The idea of the presence of a stitch not being in itself an irritant was confirmed in the minds of men by the safe use of fine buried silk ligatures for vessels, in many cases. Sometimes surgeons sought an absorbable material; and one of them in Napoleon's time tells of the use of buried catgut, which was not specially successful. It became absorbed, but gave rise to an obstinate suppuration. Sir Astley Cooper tried it also in 1820. Many years later, when American surgeons, in our Civil War, made use of animal ligatures, the English journals called it that barbarous practice of burying dead animal matter in live human wounds.

Sampson Gamgee, the best modern exponent of non-intervention in wound treatment, and of absolute rest by posture and immobilization, admits that he learned

[1] This essay was written in 1895.

his lesson from the ancients. Le Dran kept his culture media sterile by always placing the limb so as to relax the muscles, and then immobilizing. "Otherwise," said he, "the nutrient juices, not being at rest, will be converted into pus." The patient was never to help himself, but could be moved freely about if no pain were so caused, and even after abdominal section this passive motion was allowed if the abdomen were restrained by a firm swathe.

For similar reasons wounds were to be left undisturbed as long as possible. I think Baron Larrey teaches this as forcefully and convincingly as any writer of any age. His text is constantly: "Absolute rest is essential to encourage nature; therefore, leave the first dressing on as long as possible. There must also be an uniform and careful pressure over wounds." And of all bandages for almost all conditions, the best were said to be elastic flannel rollers, as they not only compressed the wound but firmly controlled the muscles.

Not only for wounds of the soft parts were these principles to hold good; but in cases of fractures, amputations, inflammations, and ulcers, — rest, elevation, and elastic compression were to be the first essentials, "for nature herself enjoins rest; the muscles won't act over an inflamed part." And in the face of the prevalent dread of joint complications Sir Astley Cooper says: "Wounded joints often heal readily if they are immediately sealed up, dressed with alcohol, and absolutely immobilized." Long before that, of all writers to insist on the value of physiological rest, Ambroise

Paré preached the most fervently and was the least regarded.

Beyond this question of rest the need of clean wounds was instinctively felt, if not logically reasoned out, by a host of thoughtful teachers. Le Dran says: "The region about must be thoroughly cleaned lest inflammation be set up and pus form; therefore, the entire field of operation should be thoroughly shaved and scrubbed, then clean up the wound, and wash with warm wine."

Every feeble ray of light in a dark past has its charm to the student. Old theories of the value of inflammation come near being illuminations at times. Sir Astley Cooper seems almost to have foreseen the advent of our phagocytes when he says: —

"Local injuries are repaired by inflammation, and we know that repair has begun through inflammation by the increasing sensitiveness of the injured part.

"Especially is this so in bones, which, when fractured, unite by the action of an inflammatory process; the action must be rapid in order that no trouble ensue, and even in compound fractures, so soon as adhesions are formed the danger is over, and healing progresses as rapidly as in simple fractures. This is true, too, of Cæsarean section. If the operation be done boldly and rapidly and adhesions form in the wound at once, we are safe."

One might be led to suppose, from such a statement as the last, that Cæsarean section was then a common operation. I don't think the writer intended to mislead, but that he was grandly theorizing on general grounds, as was his style at times.

The idea of the systemic action of infectious agents strongly impressed the men of the last century, especially after the introduction from Constantinople of the custom of inoculating for smallpox. Some seem to have had the kind of faith which is said to move mountains; for we are told of one surgeon who inoculated his own daughter from the pustule of a dead patient.

Mechanical causes for pathological phenomena were by no means overlooked; and one finds the old surgeons asking themselves such questions as: "Why, in necrosis of the tibia, does the sinus open forward and not backwards?" "What advantage can there be in gum lancing if the tooth is not thereby made to protrude?" and then shrewdly giving the expected answer.

The delicacy of new-formed tissue of any kind was a constant dread after inflammation, on account of its liability to break down. We read of old wounds breaking out and old fractures giving way, until we almost suppose that physiological processes were less vigorous in those days than they are now.

Granulations, too, were matters of considerable anxiety, and *proud flesh* was most diligently rooted out. Here is a definition of granulations: "A newly formed substance, generally red in color, and having the power of secreting pus." And Bell says that "pus is formed from the serous part of the blood by a process of fermentation."

One would suppose, too, that various forms of ulceration were more common then, for cause and effect are most astonishingly confused. Amenorrhea

was feared, not because it might be indicative of some serious general disturbance, but because it gave rise to "menstrual ulcers."

We still see pus at times; the hygiene of our people is not yet so perfect but that felons and other abscesses still occur, and we have not yet learned to abort them. Of course, in those old unclean days pus abounded and was constantly sought. *Ubi* pus, *ibi evacua*, was ever in the surgeon's mind. What we call the shirt-stud felon was the especial delight of some of those old pundits, and seems to have figured in all their clinics. Free scoring was ever being taught, and very properly; but it was in a limb the source of tetanus that the knife ran riot, supplemented by the extensive application of the actual cautery. To drain off and extirpate the morbid humors was the constant effort, at whatever expense. Counter-openings in the scalp were almost the rule, in order to prevent a dissecting abscess, and hot poultices were hourly applied. Constant attempts were being made to find some means of changing the discharges to a "laudable" character. Abscesses were thoroughly flushed and filled with antiseptic balsams; boils were curetted; and bubos were dissected out and left open, the cavity being filled with powdered calomel, which was in great vogue with some surgeons. Again, after an antiseptic washing, abscesses were sometimes closed up, and were said to adhere under a tightly compressing bandage.

On the other hand, cold abscesses and chronic local suppurations were less hastily meddled with; and it was commonly taught that suppurating glands in the

neck should be left to ripen, and should then be opened by a small *transverse* cut, as thus an imperceptible scar resulted. For the frequently resulting sinus, wine, spirits, and limewater were recommended as injections. Some of the applications in extreme degrees of inflammation sound heroic; among others mustard and cinnamon are urged; and an essential covering for all non-evaporating dressings was oiled silk.

In erysipelas Sir Astley Cooper prescribed immense amounts of quinine, alcohol, and a generous diet, with local applications of camphor and spirits of wine.

Much of this is good surgery and classical surgery. It is not the teaching of thirty years ago, but of one hundred and three hundred years ago. These things were done before ether had been dreamed of, or the theory of fermentation had germinated; yet broad lines were steadily being laid down on which we are now building our modern practice.

As we know, too, inflammations, when once under way, were sorely dreaded, and various forms of gangrene were far from unusual. One reads of the common occurrence of hiccough as the characteristic sign of gangrene, and of the frequency of moist gangrene from excessive inflammation.

I doubt if one man in five hundred, among the younger generation of surgeons to-day, has ever seen a case of that fearful scourge — hospital gangrene — which used to rage through cities.

Though heroic efforts in the way of amputations used to be made to save life, the number of limbs which was rescued from that last resort is surprising, when

one considers the means then at command. It is interesting to read of Sir Astley Cooper's aborting many an inflammation by the use of "steel" and that new form of bark called sulphate of quinine. His favorite local antiseptic was a strong, hot, port-wine poultice, and where the skin was still sound, ice or hot applications were both highly lauded.

I do not wish to dwell too much on old surgical errors; they were common enough, but some of the teaching given in the systemic treatment of acute traumatic fevers seems almost inexcusable. The last-named authority says: "In inflammatory processes after septic wounds, all stimulating food and drink (though I must omit whisky) should be avoided. The giving of them is a measure so absurd that a caution against it seems unnecessary; but lately an anatomist killed himself by taking wine to oppose the putrefactive influence of the matter he supposed to be absorbed." Tetanus, too, was constantly dreaded as an almost hopeless condition; and the universal panacea, bleeding, was admitted by some to hasten death. Amputation was thought useless, as the general character of the infection was well recognized.

Although the abdominal cavity was generally shunned as a *terra incognita*, still surgeons were perforce frequently entering it, the continual wars of old days making it a common field for traumatic surgery.

Le Dran states that he has many times resected the bowels for gunshot wounds, and that the safe practice is to make an artificial anus. When those viscera were uninjured, however, most writers of the last cen-

tury united in saying that speedy cure is to be expected, and that even when there are violent inflammations of the bowels with great distention, but no vomiting or hiccough, we may effect an easement and permanent recovery by the frequent use of salts and other cathartics. When the progress of the general inflammation is arrested but a local collection of matter remains, it should be withdrawn by aspiration, for the incision with a knife is apt to disturb the healthy gut, and is almost invariably followed by death. In many cases in which the sound viscera are protruded through the wound they should be returned immediately to the abdominal cavity, then large and frequent applications of heat and moisture should be made to the belly. If the abdominal wound is to be enlarged, it should be opened downwards with the scissors, the forefinger guarding the viscera; and when the bowels are to be handled by the surgeon, he must have his hands well anointed by some sweet-smelling oil in order that the viscera may not become excoriated and so subsequently adhere closely together. If the extended bowels are distended with gas so that they may not be returned without rupture, then the surgeon should aspirate off the wind as much as possible.

The best practice in closing abdominal wounds was that which satisfies many of us to-day. A double-headed silver or silk suture was to be passed from within outwards entirely through the parietes, and having drawn the peritoneum to overlapping, the stitch was firmly tied. Ordinarily peritoneal drainage was thought of little value, as it could affect but a very

small area. After operation the bowels were always to be kept open and loose in order that any tendency to an inflammation might be averted. The belly was to be firmly bandaged, which was often quite enough for the union of the wound even without the use of stitches. For the first few days the patient was to be kept on a low liquid diet with very little water, and the wound not disturbed. On the seventh or eighth day the stitches were to be removed and the diet increased. If there remained any discomfort or bloating, hot applications and cathartics were to be employed.

Such was the teaching in the days of Louis XIV.

A great number of expedients were tried for repairing injured viscera, and, when the bowel was cut across or necrotic, resections were attempted, with occasional recoveries. The teaching was that in this work the glover's needle must not be used, but in its place a small, round, embroidery needle. Le Dran employed a fine looped suture in stitching the divided bowel; and the principle of this was not unlike a continuous Cushing suture. It is evident that when this was drawn home the peritoneal surfaces would overlap. In all cases in which stitches were taken, the ends of the thread were drawn out at the abdominal wound and the bowel drawn up so as to be easily accessible should trouble occur, and that if necessary an artificial anus might be opened, which, we are told, most commonly would close of itself in the course of time.

An extremely interesting development of intestinal surgery, by the French surgeons of the eighteenth century, nearly two hundred years ago, was the use

of some sort of plate or ring to reënforce the end-to-end suture. This was commonly a hollow cylinder of tallow, or some other soluble material, which was run into either end of the divided gut. The bowel being stitched over it, one or two stitches were run through to hold it in place. Le Dran says that it acts admirably, and as the intestines become adherent in from fifteen to twenty hours, it is easily permanent enough.

When the stomach and small intestine were wounded, nourishment by the mouth was to be entirely omitted for five or six days, and nutrient enemata resorted to.

Various signs are recorded for evidence as to the seat of injury. Thus, for wounds of the sigmoid flexure, pain over the bladder; pain in the *yard* is indicative of wounded kidneys; for wounds of the liver, pain in the right shoulder; and in these cases as there is probably extravasation of bile in the belly, the warning is to drain always. Here it is remarked that biliary fistulæ nearly always close of themselves.

A wounded bladder was to be sewed up always were the rent intra-peritoneal, as the serous surfaces were known to adhere readily; but when the wound was extra-peritoneal, drainage was to be employed. Sir Astley Cooper said that a tendency to adhesive inflammation in the peritoneum was common, and was the salvation of the patient in these cases; and for the free catharsis, so essential to drain away the inflammatory secretions, Epsom salts and calomel were most useful, given in small and frequently repeated doses.

Thus it will be seen that traumatic abdominal surgery was undertaken frequently, doubtless also with

most frequent fatal results due to sepsis; but of pathological surgery in this region very little is said, except of drainage by aspiration, which was often employed. The usual cause for this operation was the presence of ascites or cysts. Sir Astley mentions an oft-quoted case recounted on a tombstone near Dartford, Kent: "Here lies the body of Ann Mumford, daughter of John Mumford, Esq., of Sutton Place in this Parish. Her death was occasioned by a dropsy, for which, in the space of three years and ten months, she was tapped 155 times. She died the 14th of May, 1778, in the twenty-third year of her age, an example of patience, fortitude, and resignation."

Cysts, too, were treated by the same method, though the possibility of their removal was considered, and Sir Astley proposed oöphorectomy, though he never performed it.

I have seen no evidence that the vermiform appendix was regarded as a possible source of danger or as a factor in abdominal disease, before the present century[1]; though one writer speaks of the gut strangulated by being enfolded in the vermiform appendix.

In view of the late developments of abdominal surgery, such teaching as I have cited is sufficiently striking to need no comment. *Sub sole, nova non sunt.*

When one considers the subject of tumors, in the light of old-time pathology, it seems futile to discuss the matter. Diagnoses were unreliable, and the distinction between benign and malignant tumors care-

[1] At this writing H. A. Kelly's researches on the history of appendicitis had not been published.

lessly drawn; yet there were some operative measures which must interest the modern surgeon, and some sound precepts laid down which hold to-day.

Apparently benign tumors were cut out safely and without much ceremony, one would think; for we read of the common practice of removing "chronic mammaries" in the office, and sending the patient home. Lipomata gave little trouble, and even small goitres were removed by Cooper, though he recognized, as do we, the danger of secondary hemorrhage after the removal of large goitres.

Students were, of course, constantly told to distinguish chronic mammaries from scirrhus; and Bell says that the benign tumor is very apt, in middle life, to degenerate into the malignant; and the excoriated nipple, which I take to be what we call *Paget's disease*, was regarded with great suspicion as a precursor of cancer. Another condition is described which seems to have been due to the neglect of the breasts in nursing mothers, in which quarts of fresh milk were sometimes stored in the breast by the blocking of a duct. "Drain this off and cream will rise," was the direction given. "It is not at all an abscess."

It has been understood for hundreds of years that some cancers are more malignant than others, according to their structure, seat, and other conditions.

The best teachers of the eighteenth century held that caustics were to be eschewed, except sometimes in that variety of cancer of the face known to the ancients as *Noli me tangere.*

The scirrhus of the breast may sometimes be cured

by the knife, it was said. By the best men it was thought useless to attempt cure unless breast, fascia, and axillary glands were removed thoroughly; and Sir Astley Cooper adds that more than that, the skin over the cancer with the nipple and all the infected channels leading from the breast to the axilla, whether or not they appear invaded, must be thoroughly cleared away. Even so Le Dran says: "A cancer of the breast may be removed, but it will surely return, and more especially when it adheres to the pectoral muscle." He directed that the breast should be dressed with dry lint and a firm bandage. Benjamin Bell says that the extirpation of all the axillary glands is absolutely essential, and that when this is done it is well to make a counter-opening through the dependent skin flaps for seton drainage. He goes as far even as our most thorough operators of to-day, and says that one must clear off the pectorals down to the ribs; and rather hopelessly adds that if nothing else is gained by this, much severe subsequent pain may be avoided.

Speaking of the mortality from the operation, Sir Astley Cooper said, in 1820: "Death from excision of the breast should never happen in these days. In forty-five years of surgical practice I have lost but five cases." He sums up by a statement on which we have improved but little, "That the complaint is in part constitutional and in part local."

Perhaps of all major operations in the old days amputation of the limbs was the commonest. In the seventeenth and well through the eighteenth century, nearly all seriously injured members were amputated. The

operation was almost always done for compound bone injuries, for opened joints, and for gunshot wounds. As we come down towards the Napoleonic era, however, surgery, keeping pace with the great progress of the other arts and sciences, made a decided advance. Material for practice, too, was abundantly furnished by the great European battlefields of those days; and when one reflects that for nearly one hundred years England alone was hardly ever at peace, we can understand how great must have been the increasing endeavor to save limb as well as life.

The conditions under which life might be saved were more thoroughly investigated, and we find a writer of Marlborough's time saying, "I have often observed that an amputation has more often succeeded, that is, a greater proportion of the patients have recovered, who have previously been considerably reduced than of such as have still remained in a full habit of body." A familiar example is that of a man long bedridden with a tuberculous knee, who, after an amputation through the thigh, regains health, strength, and vigor with astonishing rapidity.

Towards the end of the eighteenth century, too, attempts were made to save limbs having joints disorganized by disease. The operation of Mr. Park, of Liverpool, in 1792, who excised the knee for white swelling, was considered a most promising maneuver.

M. Bilgner, the famous surgeon-general of Frederick the Great, was a strenuous advocate of what was then thought most radical surgery — the attempt to save limbs shattered in battle; and his teaching largely

influenced the great Larrey. Even when Bell says, "An open joint means amputation," Bilgner says, "Try other means first," and Mr. Cline, Bell's contemporary at Guy's Hospital, removed successfully loose cartilages from the knee-joint, while in 1820 Sir Astley Cooper wrote, "The improved treatment of compound fractures renders it rarely necessary to amputate a limb for these accidents."

Long before the days of ether, surgeons began to look beyond mere speed in amputating; and the character of the stump as regarded its future usefulness was most carefully considered by Cooper. He followed the teaching of his predecessors in making long skin flaps, saying: "Don't cover the stump with muscles. They will retract and draw back the skin. Use skin only." He dressed his stumps with a light alcohol compress, and applied a tight roller bandage to immobilize the muscles. He seems to have frequently expected primary unions, for he directs that the dressing should not be disturbed until the eighth day, and that, pending that dressing, the temperature of the two limbs should be compared daily by the surface thermometer. Long before his day, he says, we learned to tie the femoral before amputating at the hip joint, but he adds, that after forty-five years of hospital surgery, he never had but one successful case of hip-joint amputation.

The usual custom of those days, which I have seen once or twice in country districts in our own time, was to secure the large vessels with long ligatures, which were brought outside the wound for drainage.

The high mortality of hip-joint amputations was but little improved upon until within the present generation, if one may judge from reports scattered through surgical literature, the most startling death rate recorded being that of the French during the siege of Paris, where, from September, 1870, until February, 1871, but one case of hip-joint amputation was saved.

There is one class of cases in which we have learned to amputate with greater freedom than did the old masters: in cases of gangrene they always waited for the line of demarcation, and in senile gangrene they did not believe in amputating at all.

Good genito-urinary surgery is as old as Hippocrates, and surgeons after the Renaissance got back to his standard. Stones and strictures were common enough, apparently, and were vigorously treated. It is an old French teaching that a distended bladder is best tapped above the pubes, though through the retroprostatic area is a safe path for the skilled hand; and to that same hand only should be intrusted small sounds and catheters; for the tyro should employ none but the large-sized instruments. Says the often quoted Le Dran: "The great art is to have a kind of intelligence between the hand supporting the parts and that holding the catheter." His favorite treatment for strictures was by the use of compressible bougies which would swell after being placed. These were never left more than an hour at a time. He claims never to have damaged a urethra by this means.

In the same age and for many years later external urethrotomy was done for impermeable stricture; and

Sir Astley Cooper mentions a successful case of urethroplasty from the skin of the scrotum. The same great authority advises strongly against tapping the bladder in all cases of complete retention from stricture, and makes it his rule invariably to do a perineal section.

Tumors of the scrotum and testicles received their share of attention, and most of all was hydrocele discussed. Probably the most famous hydrocele of the eighteenth century was Gibbons's, from which Mr. Cline, of Guy's Hospital, drew off *six* quarts of fluid. Radical cures were, of course, sought by various means; the favorite with most writers being some form of alcoholic injection. Sir Astley used port wine, but adds that, after all, the most satisfactory thing is to dissect out the tunica vaginalis, and sew up the skin over the testicle.

The excision of malignant and scrofulous tumors was, of course, commonly done, and was considered an operation of great delicacy. Most especially does Sir Astley reprobate "that cruel practice of tying the whole cord with a broad ligature, which is now being properly abandoned by every good surgeon."

It is needless to go into the discussion of cutting for stone as practised by the old surgeons. The mechanical part of our present methods is but little changed, except that we now more often employ the suprapubic route. Attempts were frequently made to remove stones per *vias naturales*, but it was reserved for our own Bigelow to render that method practicable.

If there is any one surgical procedure of those days which is conspicuously absent from our own practice, it is that of bleeding. As we know, bleeding was

not by any means limited to phlebotomy, but both arteries and veins were opened; and cupping and leeching were employed according to the special complications.

It would be futile here for me to go into the question of bloodletting as it was discussed by our fathers, the point of most interest being to inquire how judiciously it was employed, and how far from indiscriminate was its practice.

In this connection Baron Larrey says: "It is a great and sometimes fatal mistake to bleed immediately everybody that has had a fall or received an injury. Such bleedings augment the state of collapse, and frequently deprive nature of the few remaining resources to reëstablish the equilibrium between the enfeebled vital forces."

Sir Astley Cooper, too, bled "sparingly and with great caution for fear of impairing the reconstructive powers." He "especially avoided bleeding in compound fractures." "The one indication for bleeding," he said, "is a *hard* pulse, no matter what its rate or volume."

In cases of tetanus, in which the classical treatment consisted of opening the vein in a warm bath, he vehemently asserted that both the bath and the hemorrhage did great harm, and that bleeding in lockjaw hastens death. Here, as in other infectious conditions, he used opium; and, after the favorite method of moderns, he said: "In giving opium, use small and frequently repeated doses. Large doses nauseate, and the effect is more transient."

Men differed much about their methods, and Larrey's assertion that general bloodletting is preferable to leeching would not altogether commend itself to us. His reason was that leeches, so far from dispersing the inflammation, increase it and invite an attack of gangrene.

Perhaps the most logical and frequent use of bleeding was in the case of head injuries, and in this respect I believe we might learn an occasional lesson. In all head injuries in which there was obvious brain compression, not only were ice caps and cathartics resorted to, but free bleeding, especially from the temporal artery, was the rule.

It would be an endless task, too, to go into the subject of complications of injuries. The treatment of gunshot wounds, for instance, was a matter of constant surgical warfare; the main contention, then as now, regarded the infectiousness of bullet and punctured wounds. Larrey says, "Enlarge and drain all punctured wounds"; and in another place, "Don't touch gunshot wounds, but dress them and leave the dressing undisturbed until the seventh, eighth, or ninth day." And Bell says: "Do not needlessly and for a long time explore wounds for bullets or other foreign substances." Indeed, nearly all of the best old authorities agree in leaving alone inaccessible bullets.

Benjamin Bell's treatment of bruised and sprained joints, too, reminds one strongly of the best treatment of our own days: "In severe sprains first plunge the ankle into very cold water. In the subsequent treatment use frequent hot and cold bathings, shower-

ing from a height; then rubbings with emollients. A flannel bandage should be constantly worn, carried smoothly and spirally from the toes to the knee." And Cooper says that, in these injuries, when there is much undispersed inflammatory exudate, we should use electricity to absorb the indurations, but the best of all are mercurial ointments and friction.

One might go into the discussion of the treatment of gangrenous quinsies, by which is evidently meant diphtheria, of the value and abuse of tracheotomy, of the nerve suture and tendon suture, of the treatment of aneurism, and similar subjects almost without end; but, fascinating as such research and inquiry become, it would lead us too far afield for the purposes of this essay.

Such an article would be incomplete, however, without some further reference to head injuries, a subject of great controversy in the preantiseptic days, and dreaded equally with wounds of the joints and abdomen. We know that the custom of trephining is very ancient, not only from our own literature, but from Mexican and Egyptian remains which are thousands of years old; but leaving that aside, the practice of more recent days touches us most nearly.

It was early recognized that skull fractures are not in themselves dangerous when not compound, though the extent of the fracture in such cases is impossible of determination; and a fact is emphasized which even with us has been seldom mentioned, namely, that a blow on the vault may produce a crack entirely encircling the skull.

We know how the practice of trephining fluctuated from time to time, according as one school or another became prominent and popular. Through the eighteenth century English surgeons and many French surgeons trephined constantly, but it was the teaching of the French army surgeons, especially of Larrey, which gradually brought about a change.

Larrey said, "Trephine for evident cause — for splintering, depression, or effusion causing compression symptoms"; and Cooper adds, "Trephining for concussion is now completely abandoned; however, in obvious cases trephine, but not through the uninjured dura." More than fifty years earlier Le Dran had taught to explore thoroughly all wounds of the scalp and to trephine punctured fractures. He had a sure instinct for surgical cleanliness, and insisted that the head must be thoroughly and entirely shaved to avoid clotting the hair with blood, and consequent fouling of the wound. He said also that in all head injuries, and more especially when the skull is opened, thorough drainage should be instituted. The most frequently employed treatment for pressure symptoms was general bleeding, as I have said; all the old authorities insist upon it, and cite many cases in which it was obviously of benefit.

Hemorrhage from the meningeal artery was checked, however; the most highly lauded hemostatic being the actual cautery.

Baron Larrey seems to have recognized the advantage of draining thoroughly the base to prevent pressure symptoms, for he describes the case of one Nicholas Baumgarten, a private, who received a fencing thrust

through the orbit which did not injure the eyeball. At once a copious draining hemorrhage came on and persisted for a day or two, so that there were no pressure symptoms, and the man did perfectly well. Later the orifice became plugged, compression of the brain developed, and the man died on the fourth day.

He cites another case of undoubted fracture in the middle and posterior fossæ. A cavalry officer fell from his horse upon his head. There was immediate coma, with profuse hemorrhage from the ears and mouth, which was allowed to persist. After two or three days large ecchymoses developed behind the mastoids. Treatment consisted in supplementing the depletion of the brain by opening frequently the external jugular veins and occipital arteries. The man recovered.

In view of our recent advances (1895) in cerebral surgery this case is full of interest.

We know that shrewd guesses at cerebral localization had been made before Larrey's time. He himself notes that "in injuries to the cortex cerebri by pressure the intellectual faculties are impaired; in injuries to the base and ventricles there are paralytic phenomena, but not intellectual." Also that "in extensive injuries to one hemisphere the opposite limbs are paralyzed; therefore even in old cases operate for the removal of pressure on the opposite side."

Speaking of the phrenologist's bump of amativeness over the occipital protuberance, Larrey notes the peculiar physiological effect of traumatism in that region, and relates several cases of gunshot injury to

the back of the head followed by impotency and atrophy of the testicles. He speaks with a note of admiration also of the reverse process, telling of castrati who have lost their bumps.

A further fact which became well recognized in the eighteenth century was that "considerable portions of brain matter may be lost, and, if there should be no inflammation, life and even the functions are not jeopardized."

The old field surgeons were, of course, well accustomed to seeing serious brain lacerations in battle as well as resulting fungi cerebri. Larrey recognized the uselessness of attempting their reduction or excision, and states that the real source of the trouble is swelling of the brain itself for some cause. He recommends constant limewater applications with strapping.

Le Dran asserted that when a bullet is obviously lodged in the brain, it can be safely probed for with an elastic catheter, and removed if found.

In connection with the practice of chiseling out bone flaps instead of trephining, another statement of this surgeon is striking. He tells of a skull from which a large slice had been cut by the glancing stroke of a sabre. The bone with the overlying soft parts had remained hinged to the skull by firm attachments, had been replaced, and had thoroughly reunited, leaving only a thin cicatricial line of union, with no loss of substance.

Many other branches of surgery prominent in the modern schools I have omitted: ophthalmology, laryngology, gynecology. These represent comparatively

new studies. This short sketch of a subject so broad and a literature so voluminous is obviously not intended to be a rigorous critique, but rather a selecting out of some little of the notably sound work, leaving us moderns to compare it with our own; to show how good those ancient men were, not how much better we have become.

SIR ASTLEY COOPER, BART.[1]

AN ESTIMATE OF HIS CHARACTER AND CAREER

ONE of the most interesting and picturesque figures in all surgical history is that of Astley Paston Cooper. Well born and bred, highly gifted both mentally and physically, of enormous industry and ambition, living at a time of revolutionary changes in the world's history, — changes social, political, and intellectual, — he was a fit contemporary of such men as Fox and Canning and Mirabeau and Hamilton — less mercurial than the first and only less brilliant than the last.

Somewhat younger than those distinguished men, he was brought under the same great influences; and though he died near the middle of the last century, he had known Dr. Johnson, had heard Hunter, had seen Robespierre and George III, had experienced Waterloo, and had lived to be honored by the Citizen King. Whatever there was in life for the finding, that Cooper found, and amid all the changes and chances of an extraordinary era he is seen always steadily advancing.

Astley Cooper was born on the 23d of August, 1768, one year before the great Napoleon. In France old Louis XV was living; in Germany Frederick was

[1] Read before the Historical Club of Johns Hopkins Hospital, May 9, 1898.

resting on his laurels; in America Washington was an obscure country gentleman; and in England George III was still a young king. There was peace at home and abroad, though the great undercurrent was already at work, destined to overturn the geography and dynasties of the world. Of all the peoples about to become embroiled in this turmoil, the English and Americans alone were to emerge with added strength; and parallel with the fluctuating but always advancing fortunes of his people, Cooper's life developed in vigor, resourcefulness, and success.

A great deal has been written and said about this man, but I do not find that his true significance has been appreciated. He was not a hero; perhaps not one of the world's great men; but like a few others of his day, he felt early the import of what was being done by the wide forces behind men, and in his own sphere of life he grew to typify the revolution in which he lived.

Great changes in politics, philosophy, literature, and science do not come suddenly, full grown, as we know. It is evolution that leads to what men call revolution. Rousseau preceded Jefferson; Descartes preceded Darwin; and John Hunter preceded Astley Cooper.

The traditions which lay behind and surrounded the young Cooper were certainly not of a kind to develop his natural genius. His ancestors belonged to the country gentry class; his father was an excellent clergyman, of independent fortune; his mother a fond, sweet woman who wrote moral poems and tales for the young, and found a publisher. Astley Cooper

was born a younger son to this couple at Brooke, in Norfolk. There, and later in Yarmouth, he grew up a wild, generous, mischievous, brilliant boy, the plague and astonishment of his parents.

I find no tales of him that presage his later fame. His dull and pompous nephew, Bransby Cooper, has written a life of him, and tells of how he applied a tourniquet to the thigh of his young foster brother, who had been injured and was bleeding from the femoral artery. A chapter is devoted to this scene, and there is much feeble wagging of heads; but I doubt not that boys other than embryo great surgeons have done the same before and since.

This young Astley was forever in scrapes, and would have none of books. The practical jokes of the day were brutal enough, and of them he had his share. Such tales are but dull to hear.

So he grew up, wild, ungoverned, and unread, but kind and gentle toward all women and young children. In the course of time his brothers, steady persons, well instructed by the good scholar their father, went their ways to the university. For him there was nothing in life of that sort, and it was not until his uncle, William Cooper, from London, a surgeon of repute, came down to visit at the parsonage, that a clear path became open to him.

The anxious father was only too glad to find some congenial employment for the exuberant son, and so with many anxious prayers and solemn blessings from his elders the lad was sent to London to make his way.

Astley Cooper was sixteen years old when he began

the study of medicine. His preparation was slight enough; a little Latin and mathematics, a smattering of French, and a good constitution were his stock. He had read little and never became a reading man. Like Hunter, Hume, Brodie, and many others, he would learn all things for himself, and cared little for the written thoughts of others — ancients or moderns. It was a sign of the times; men were finding out the facts of life for themselves, and cared little for knowledge at second hand.

Here is a description of his outer man, in the stately words of his biographer: "His manners and appearance at this time were winning and agreeable. Though only sixteen, he was tall and finely proportioned, healthy and manly, with a countenance handsome and expressive. His talk was brisk and animated, his voice and manner pleasing and well bred. He was graceful and agreeable, popular in society, and always greatly influenced by women." This is a pleasant picture, and one sees him the young Apollo indeed.

Cooper had the rare good fortune to be placed as articled pupil with one of the greatest surgeons of his time — Henry Cline. The uncle who had brought him to London seems to have been a jealous and uncomfortable person, and readily parted with his tempestuous kinsman.

Cline was an interesting man. At this time, 1784, the American war had been concluded, and those democratic principles, which had gained such headway in France, were professed in a milder degree by great numbers of liberal Englishmen. Cline was always an

advocate of such opinions, and at this time was intimate with the celebrated Horne-Tooke and with Thelwall. To such a band was joined young Cooper, who eagerly adopted their views, and so pained beyond expression his anxious friends at home.

It is evident to one following his course that his whole trend of thought and endeavor were strongly influenced by such pursuits; and though, like most Englishmen, he fell back in later life with the strong conservative tide setting against all things French, still the broad manner of thinking which he early learned colored always his subsequent career.

Cline cared much for all these things, but that did not prevent him from being a sound surgeon and an accomplished teacher. He was eighteen years Cooper's senior. In later years Sir Astley wrote many comments on men he had known, and this is what he says of Cline in one place: "In surgery he was cool, safe, judicious, and cautious; in anatomy, sufficiently well informed for teaching and practice, but he lacked industry and professional zeal. He was gentle, firm, mild, unruffled." This is pleasant but not high praise. Cooper had high ideals, and after middle life, when phenomenal success had established his own confidence and self-esteem, he was never lavish of praise for others.

But Cline's political friends were not his only associates. He knew well and appreciated John Hunter. To that remarkable man the young apprentice was soon introduced, and the teachings of the great scientist at once captivated and engrossed the youthful scholar.

Of the method of Hunter I need say but a word.

It was a method as old as that Babylonian Zadig, of whom Huxley tells the story. It was what we call the inductive method. But what Hunter did was to apply it faithfully, unselfishly, unfalteringly to biological science and the study of medicine; until, in spite of opposition, hatred, contempt, and ridicule, he placed these studies, and the men who profess them, in that dignified and ennobled position before the eyes of the world which a hundred years have only increased and strengthened.

Cline appreciated him, and this is what he says of him: "Having heard Mr. Hunter's lectures on the subject of 'Disease,' I found them so far superior to everything I had conceived or heard before that there seemed no comparison between the great mind of the man who delivered them and all the individuals, whether ancient or modern, who had gone before him." Cooper himself said later of Hunter: "Mr. Hunter was, as Lavater said, *a man who thought for himself*, but he was more; he was the most industrious man that ever lived." Here is an anecdote which Cooper tells of Hunter, who was often slipshod and indifferent in practice, in spite of his enormous knowledge: "Mr. Howden had a patient with an obstinate running sore whom he brought to Mr. Hunter for consultation. They went into Mr. Hunter's room, and the case was explained. Mr. Hunter folded his arms and said: 'And so, sir, you have an obstinate running sore?' 'Yes, sir.' 'Why, then, sir,' said Mr. Hunter, 'if I had your running sore, I should say, — Mr. Sore, run and be damned.'"

Cooper early perceived (and it was a knowledge he received from Hunter, not from Cline) that a thorough knowledge of anatomy is at the bottom of all successful surgery. Before his day there was no anatomical study and instruction as we know it. There were some anatomists, but they were not to be found among the ordinary students and practitioners of surgery.

Mr. Cline was surgeon to St. Thomas's Hospital, and it was in the schools of the United Borough Hospitals, St. Thomas's and Guy's, that Cooper received his education. The amount of time that he put into anatomical studies would be impossible to students of our day, with their elaborate curriculum and carefully regulated hours. In those days there were no graded courses. Certain lectures on anatomy, surgery, and medicine were held, and bedside teaching was given; but until the time came for going into practice the young men were allowed to dispose of their hours as they pleased, so far as the school was concerned. It was over the articled pupils only that any real control was exercised, and these were always the men who rose to position and influence in after life.

To Astley Cooper the study of anatomy meant not only the normal dissections, but pathological dissections and comparative anatomy. From the second term of his medical studies until the day of his death, his industry in all these lines was enormous.

To rise at four, to dissect for two hours before breakfast, to demonstrate for his fellow-students all the morning, to hear lectures and assist at autopsies until dinner,

and to dissect again until near midnight, — these were for many years his regular occupations.

The various and fascinating lines of research which engross students to-day were mostly unknown a hundred years ago. Microscopy was in its infancy, chemistry was crude, bacteriology and all its attendant interests were of course undreamed of, so that the patient and thorough student confined himself mostly to gross inspections in the case of human pathology, and to the investigation of phenomena in animals, living and dead.

It is marvelous to what a degree of accuracy those men trained their unaided senses. Without the microscope, the culture tube, the stethoscope, or the thermometer, those differentiations known to us were impossible. But students made the most of their few talents, and the great collections of Hunter, Cooper, and others bear witness to the enthusiasm and wide range of their inquiries. It was in their observations on the structure of the lower animals that both of these men excelled and outstripped their contemporaries. Hunter did not stop at the dissection of a whale, and Cooper had a dead elephant brought to his house, and worked upon it in his courtyard. Both secured the reversion of animals that died in the collection at the Tower, and found in this a mine of material for their work.

As Cooper grew into practice, he never allowed anything to interfere with such daily avocations. When patients thronged to him in the morning, he put them off until his consulting hour of eight o'clock, so that the time between five and seven might be devoted

uninterruptedly to anatomy and pathology. He made one great collection which he gave to St. Thomas's, and later, when the schools were separated, he plunged with renewed ardor into the formation of a museum for Guy's; and before his death this too had grown to great size. In these pursuits there was no rest for his assistants. He knew good men and how to make use of them, and was able to inspire them with his own enthusiasm. If an autopsy was desirable, it must be obtained; if a strange animal was heard of, it must be brought to him for dissection; if a lecture was to be given, it must be illustrated by specimens from his own museum; and if his collection was at fault, the lack must be made good. Wherever he went he studied and investigated; when at home with his parents he haunted the shop of the local chemist; when traveling abroad for pleasure he spent his time in museums, hospitals, and dissecting rooms; when at his place in the country he tried vivisection experiments on his own pointers, and stopped to dissect the very birds that he shot.

In 1834, when he was sixty-six years old, he made an extended tour on the Continent, and from notes in his diary we find the sort of busy man he was: —

"Paris, Oct. 7th. At half-past ten I called upon M. Dupuytren. He was ill. I found him with loaded lungs and a quick pulse, 140, short breathing and with a sunken countenance. . . .

"Dupuytren has provided me with all I wish for as to the cadavers.

"Oct. 8th. Rose at six and went with Dr. Marx to

see the provision Dupuytren had made for my dissecting. We went to the Hôtel Dieu, and I found a room devoted entirely to myself. A cadaver there. I dissected for nearly two hours before breakfast, and afterwards for four hours, between ten and two o'clock.

"Oct. 9th. Dissected from ten until one. . . .

"Oct. 11th. Went to the dissecting room but found they had removed my subject."

He never rested, and I doubt if he could have been a very comfortable person with whom to live; but his friends loved him, and from the first he secured the enthusiastic admiration of his contemporaries in the profession.

Poverty never came to burden or to stimulate Astley Cooper. In his student days he was comfortably supported by his father, and in the beginning of his practice he married a wife with a fortune. The unceasing anxiety and effort to make a fair living which submerges and drives to the wall so many brilliant young professional men did not come to him. He never knew the maddening anxiety of waiting for a practice, and even in the height of his career he subordinated his patients to his teaching.

To learn for himself and to tell others what he knew were the first and ever present objects of Astley Cooper. He was the first English surgeon to break away utterly from empiricism and quackery, and to lay down the sound ethical principles which we know. John Hunter had shown the way, but in his practice had fallen far short of the high standard which Cooper always maintained.

Cooper was but eighteen years old when he began to teach anatomy. He was a young student, clever, assiduous, enthusiastic, and his fellows sought his advice in their dissections. His popularity constantly increased, and before long he had unwittingly drawn most of the students from the teaching of the regular demonstrator. Dislike and jealousy naturally followed, and continued for some years. At length, fortunately, the regular demonstrator retired; he was a man very much Cooper's senior, and at the age of twenty-one the young surgeon was appointed demonstrator at St. Thomas's Hospital. His first act was revolutionary. The sciences of anatomy and surgery had always gone hand in hand up to this time, but Cooper had the wisdom to see that a broad and sound knowledge of the former must precede the study of the latter. In spite of great opposition he carried out his plan of separating the two courses. He had now been five years a student, and the next three years, preparatory to his starting in practice, he devoted to teaching. Long afterwards he wrote of himself: —

"My industry, at this time, may be gathered from the following circumstances: —

"I went to the hospital before breakfast to dissect for lecture. I demonstrated to the students before lecture. I injected their subjects. I lectured from two o'clock until half-past three. In the evening, three times per week, I lectured on surgery. I attended to the interesting cases in the hospital, making notes of them, and in this latter practice I always persevered."

Cooper's method of teaching showed from the out-

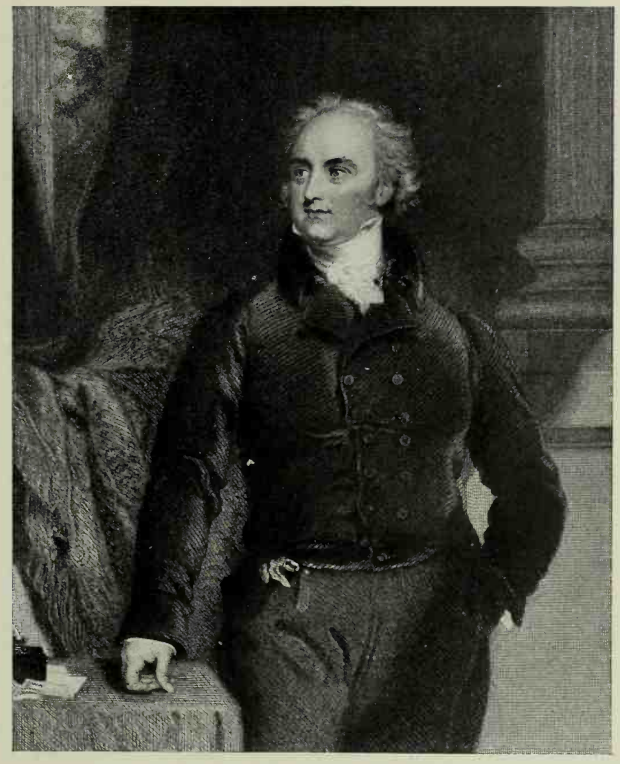
set his facility and adaptability; his readiness to continue what was approved by experience, or to depart radically from old and dull routine. On assuming his lectureship his instant resolve was to inculcate the doctrines of Hunter — by which he meant the study of normal function and pathological change before going on to speak of diagnosis and treatment. At the outset he found himself in deep waters. The students of the day were not ready for that style of thing. The attendance, which was voluntary, immediately fell off; and he felt that his new plan was in some way at fault. At once he changed his method but not his purpose, and organized that form of combined didactic and clinical lecture which is still most popular in our schools. He has left us copious reports of his teaching, and to read these is still a novelty and a delight. His wide experience, his teeming notebooks, his varied collections, and his phenomenal memory combined to furnish a fascinating discourse; and his lectures, carefully planned and accurately carried out, supplied at once variety, anecdote, instruction, and conviction. His statements are short, sound, and lucid; his cases graphic and to the point.

As the years went by his material multiplied; at the age of thirty-two he was appointed surgeon to Guy's Hospital, and with added experience and power he came to be known far and wide as the greatest surgical teacher in Europe. His students came from England, Germany, Italy, Switzerland, France, Denmark, Sweden, Scotland, Ireland, America, until in his later life, when he went traveling about the world,

he found an old friend in every village and counted his pupils by thousands. This was a great power, and needs no comment. Best known among those who came under his influence were Aston Key, Bransby Cooper, Benjamin Travers, John Morgan, John Collins Warren, John Hilton, Edward Cock, Alfred Poland, and Frederick le Gros Clark.

The fine portrait, by Sir Thomas Lawrence, shows us Sir Astley Cooper in the prime of life; as such a man he is best known to us, and such he was in the height of his life work. His practice at that time was enormous, and he saw more patients than would be possible for any one man in our elaborate days. After his morning dissections and breakfast he saw his gratuitous patients first, and then from nine o'clock until one came the stream of regular patients to his consulting room. Here he did every variety of practice — from advising boarding-school girls about their diet to operations of considerable magnitude. Quick and sudden cutting was common with him. He would open a felon, excise a lipoma, or amputate a finger with hardly so much as a *by your leave.*

Promptly at one o'clock, regardless of the fact that his house was still crowded with patients, he would jump into his carriage and drive rapidly to the hospital. There he always made the ward visit at once, accompanied by a throng of students. His manner towards hospital patients was always most kindly and considerate, and he used to say that he owed half his success in practice to his invariable rule of impartial courtesy towards rich and poor. At two o'clock



Sir Astley Paston Cooper, Bart.

promptly he began his daily clinical lecture, which, combined with operating, lasted from one to two hours. He then left the hospital to make his round of private calls, and arrived at home for dinner about seven o'clock. After dinner came a half-hour's nap, then the evening calls, and home to bed between twelve and two.

He insisted strongly upon the value of a certain amount of general medical practice, as he felt that no surgeon who narrowed his attention to the immediate and obvious lesion under inspection could consider properly the broad bearings of surgical disease upon the individual. He always stated in his lectures that the mere operation was a small detail in surgical therapeutics; that general conditions of health required the most careful investigation — for which only a man in large general practice was competent; and that the care of the sick after operation demanded the widest experience.

Astley Cooper did not jump at once into practice. His beginnings were small enough, and he met with the rebuffs and insolence with which all young professional men are familiar. Here is a schedule of his early receipts: first year, £5 5*s*.; second year, £26; third year, £64; fourth year, £96; fifth year, £100; sixth year, £200; seventh year, £400; eighth year, £610; ninth year (the year he was appointed surgeon to Guy's Hospital), £1100. This was the year 1800 and he was thirty-two years old.

In those days, as is well known, surgeons did not make stated charges, but received the fees proffered

them. In 1813 Cooper received the fee of £1000 from a patient for the operation of lithotomy. This was the largest fee he ever received. The year 1815, when he was forty-seven years old, saw him at his busiest. After that year he moved to another quarter of London, and used to take longer and more frequent holidays at Gadesbridge, his country place. In 1815 his bank book shows his professional income to have been £21,000, or more than $100,000 — a far larger sum at the beginning of the century than it is now. Be it remembered, too, that this income represented the accumulation of a vast number of small fees, and that it was not derived from a limited number of high-priced operations, such as to-day constitute the practice of surgeons with large incomes.

Having reached the height of his professional career, appointments and honors were showered upon him from many quarters. He was made sergeant-surgeon to two kings, George IV and William IV; he was decorated by foreign monarchs; he was made honorary member of many famous scientific bodies, and given the highest rewards of the profession at home by his contemporaries.

George IV made him a baronet, not, as Billings states, because he removed a wen from the royal head — a perversion of fact. He was made surgeon to the king, and performed the trivial operation because he was the first surgeon in Europe; and because of his high professional standing he received the rank.

It is refreshing to read Cooper's estimate of himself and his career. He was a great journal-writer.

Here are the ingenuous remarks which he once made in his old age; they were written in Paris: "I then went to the *Soirée de l'Institut*, and this I feel to be one of the proudest days of my life; being in a foreign country, among strangers, and received with so much honor. When I look back upon myself, as the son of a country clergyman, then made a lecturer on Anatomy and Surgery, F.R.S., Surgeon to Guy's Hospital, Surgeon to the King, Sergeant-Surgeon to the King, Fellow of most of the societies of Europe, Trustee of the College, and an Examiner, a member of the Legion of Honor, etc., I have indeed reason to be thankful for the blessings I have enjoyed; and when I add to these my title and fortune I feel how much my success has exceeded my deserts."

"Young medical men," said Sir Astley Cooper, "find it so much easier a task to speculate than to observe; they are apt to be pleased with some sweeping theory, which saves them the trouble of observing the processes of nature." And so, as I have said, he was wont to investigate all things for himself. This habit produced in him one unfortunate effect. He seldom read. He acquired a vast amount of contemporary information from discussions with his colleagues, but he was not a reader. He wrote. He was continually talking, lecturing, writing: surgical essays, collected lectures, monographs, monumental works. From the time he joined the Physical Society, as a young student, until his death, he was constantly writing and talking and rubbing against able men. When he did a new or clever operation he talked about it, and when he had

concluded a series of investigations he wrote about them. He is famous for his work on aneurisms. In 1809 he tied successfully the carotid for aneurism, after having first assured himself of the safety of the operation by vivisection experiments on dogs. The case was reported in the *Transactions* of the Medical and Chirurgical Society. Seven years later, in 1816, he performed the operation for which he is most celebrated — ligature of the aorta for aneurism. This, too, was preceded by experiments on dogs, which proved its feasibility. The patient was a middle-aged laboring man in the Guy's Hospital wards. The aneurism was of enormous size, occupying the left common iliac and some portion of the abdominal aorta. The man was extremely feeble and exsanguinated from repeated slight hemorrhages. The operation was done at night, of course without anæsthetics, intraperitoneally. The man survived for forty hours.

I find eight recorded cases of this operation, — all fatal, — but all before the days of clean surgery. Sir Astley's original case shows the patient surviving longer than did those of any of his successors. In 1804 he published his well-known "Treatise on Hernia"; in 1837 the "Treatise on Dislocations and on Fractures of the Joints"; and in 1840 that "On the Anatomy of the Breast." These three great works were for a long time classics, and represented a vast amount of dissection and investigation. They were published in handsome form, but were sold cheaply so as to be within easy reach of the professional public; and to their author the pecuniary return was less than nothing. During the thirty-

six years between the first and last of these works he published many monographs and volumes of collected lectures — of great value and interest to-day. Here is what the *Medico-Chirurgical Review* says of the second work, that on "Fractures. . . .": "Such a mass of important practical material was never, we believe, before laid open to the public; and Sir Astley Cooper's work, when the author has molded in the dust, will continue to exercise that influence on the surgical profession at large which he has so long exercised within the sphere of his personal acquaintance and practice."

He says of himself: "My objects in life have been three-fold: first, to learn; secondly, to practice; thirdly, to publish to the world."

Like most greatly successful men, Astley Cooper grew somewhat self-assertive and arrogant as he advanced in life.

In 1825 he resigned his lectureship at St. Thomas's on account of some impairment of health. Before this resignation he supposed he understood that his associate, Mr. Key, was to succeed him. The committee saw fit, however, after accepting the resignation, to appoint a Mr. South. Sir Astley, who had a very hot temper, after attempting to withdraw his resignation, and not being permitted to do so, decided to establish an opposition school of medicine at Guy's Hospital, this largely through the good offices of a friendly treasurer, Mr. Harrison. The plan succeeded beyond all anticipation; new buildings were erected, and appointments made according to his desire.

Out of this affair grew a quarrel which stopped short of a duel only. Dr. Cholmeley, a jealous person, and a physician to Guy's, made offensive remarks about Sir Astley, charging him with self-interested motives, and this in a public lecture-room. Sir Astley heard of it, and sent a demand for an apology or a hostile meeting. Eventually Dr. Cholmeley apologized, and a public retraction was made.

The School of Guy's Hospital, thus established by Cooper, continued to flourish as we know it to-day. It was ever a favorite interest of his, and on his death he left it a legacy of £4000; the interest of which was to be paid out annually as a prize for an essay on some medical or surgical subject. This prize was open to all competitors, and the members of the hospital staff were appointed judges.

The ingenuous and childlike self-approval of many a genius is refreshing. Sir Astley Cooper was one of these pleasant persons. There is nothing offensive in his egotism. He was appointed lecturer on anatomy to Surgeons' Hall when twenty-five years old, and this is what he wrote of the transaction in his memoirs: —

"I was appointed Professor of Anatomy to the Company of Surgeons, and gave lectures on executed persons, which were received with great *éclat*, and I became very popular as a lecturer. The theater was constantly crowded and the applause excessive. My uncle was quite delighted, and Mr. Cline complimentary, which he seldom was."

In another place, when writing of his lectures at Guy's Hospital, he says: —

"My lectures were highly esteemed, but my operations were less thought of, . . . still I rose; for —— and ——, of Guy's, were indifferent surgeons, —— and ——, surgeons of St. Thomas's, were still inferior; although excellent, Mr. Cline was very cautious never to attempt but those things which he was sure to accomplish. He was slow, cautious, and successful. I was sometimes great, sometimes in difficulties, from venturing too much."

Then he goes on frankly to criticise his colleagues: "Abernethy was a man of talent, with what the king would call 'a potato in his head.'"

"Sir —— —— was vain, ignorant, and puzzle-headed, excessively envious of others, but he was so great a fool that he was not dangerous."

"Mr. Norris . . . was very ignorant of anatomy."

"Sir —— —— had genius but no judgment."

"Mr. —— was a tolerable anatomist, but quite devoid of scientific views."

And of himself, he says: "Sir Astley Cooper was a good anatomist, but never was a good operator where delicacy was required.

"Quickness was his forte . . . his prognosis good. In judgment he was far inferior to Mr. Cline in all the affairs of life. His imagination was vivid and always ready to run away with him if he did not control it.

"His principle in practice was *never* to suffer any one who consulted him to quit him without giving him satisfaction on the nature and proper treatment of his case."

Quacks and impostors flourished in those days even as in ours. Human nature will always demand the marvelous, and a hundred years of effort have not succeeded in instructing the community, though laws have been passed and pseudo-science is widespread.

One of the most exasperating tricks of the charlatans is their frequent habit of trading on great names and truths. In our time Koch and Charcot and Lister have been so afflicted. Cooper, too, was a victim. Among other impositions was what was known as "the Ashley Cooper set." The substitution of the name Ashley for Astley saved them from the law. They advertised far and wide under the semblance of the great surgeon's name and are said to have done an extensive practice.

For all these things Cooper had a contemptuous tolerance, feeling that such evils would be righted by time.

Before his great work on hernia instructed the profession, the treatment of this condition was much neglected in England, and consequently fell into the hands of the "rupture doctors," — dangerous and unscrupulous fellows, engaged in a trade analogous to that of the so-called "bonesetters" of to-day. Cooper did more than any other one man to break up the practice of these persons.

In the profession at large Sir Astley was universally popular. His great reputation, his charming presence, his cordial manner, and his unfailing courtesy won hosts of friends, especially among the general practitioners. There is a story of his happening to

be present at the Norwich Hospital in 1809, when a local surgeon was operating for the cure of popliteal aneurism. In the presence of the distinguished visitor the operator became confused, and though he had made his cut over Hunter's canal, he failed to find the artery. While he was fumbling about in hopeless indecision, Cooper, looking over his shoulder, said, "You have it there"; and passing his finger into the lower part of the wound disclosed the vessel. The whole thing was done so tactfully that the incompetence of the surgeon was not made to appear, though the kindly act won the respect and admiration of all present.

It was not in his professional relations alone that he was esteemed. He was held in the highest regard by all who came within the circle of his influence, and from the king down he was almost universally popular. This, too, in spite of a fierce and hasty temper which seemed only to endear him the more to its victims. He had little time for social amusements — but when he would take his ease, the club known as the Athletæ, composed mostly of professional men, was his favorite resort.

He was ever active. He hated delays. When traveling he always posted, and feed the postboys beyond precedent for fast time.

One of his peculiarities was a terror of the sea. Though a bold and venturesome person in all the other affairs of life, a sea voyage was always a source of horror to him. He became excessively seasick, and this only added to his fears; on one occasion, when

making a voyage of rather unusual length for him, the combined effects of mental and physical distress threw him into a pitiable agony of delirium, amazing to those who knew his usual fortitude.

He was an emotional man. In 1827 his wife died, and the event prostrated him with grief. He felt that all the interests of life were over for him. He fell into an acute physical decline, sold his town house, threw up his practice and other professional employments, and retired to his country place to pass his last days. Within a year of the sad event he had returned to town, taken another house, resumed practice with increased vigor, and married again. He was then sixty years old, He lived on until 1841, and died in his seventy-fourth year.

As with many other great but self-centered men Sir Astley Cooper's estimate of others not in his own path of life was apt to be curiously erroneous. Successful men are wont to regard others only as they affect themselves; and to prefer unobtrusive or flattering mediocrity to abusive and pugnacious genius.

George IV was an agreeable and kindly patron to his sergeant-surgeon, so this is Sir Astley's estimate of the king — an extraordinary estimate to us, after the lapse of eighty years : —

"The abilities of George the Fourth were of the first order. He would have made the first physician or surgeon of his time; the first lawyer, the first speaker in the House of Commons or Lords, though perhaps not the best divine. As a king he was prosperous, for he had the good sense to be led by good ministers. . . .

"The king was indolent, and therefore disposed to yield to avoid trouble; nervous, and therefore anxious to throw every onus from his own shoulders. He was the most perfect gentleman in his manners and address — possessing the finest person, with the most dignified and gracious condescension, yet excessively proud. . . .

"George the Fourth had an extraordinary memory — he recollected all that he had read or seen — and had the faculty of quickly comprehending everything. . . . He could quote the beauties of almost all the works in English literature. He was an excellent classic. He was a good historian. He spoke German and French as well as his own language. He spoke remarkably well. . . . His judgment was good. . . . He was in danger in coming back to England after his visit to Ireland, and behaved with the greatest coolness.

"The king was sometimes coarse in his conversation and anecdotes, but nobody could be more refined when he chose. He was witty. He woke early and read from six until ten. He did not in general drink much."

Listen to Thackeray's words about the same man, written thirty years after the king's death.

"To make a portrait of him at first seemed a matter of small difficulty. There is his coat, his star, his wig, his countenance simpering under it . . . and yet after reading of him in scores of volumes, hunting him through old magazines and newspapers, having him here at a ball and there at a dinner, you find you have nothing — nothing but a great *simulacrum*."

So William Thackeray; and so Sir Astley Cooper.

We admit that at such work the pen is mightier than the scalpel.

But in spite of all this we must not think of Sir Astley Cooper as a courtier. In his age he grew to have a great respect for the constituted authorities. To him a king was a king; and a lord was a lord indeed. England was the most beautiful and pleasant country under the heavens; and there were to be found the bravest and wisest men, the most lovely and virtuous women. He says so a dozen times, and we think none the less of him. The democracy of his ardent youth fell from him, as it has done from so many others; but his great work in life went on.

Always the honor and prosperity of his profession were most dear to him. Whenever he heard of a fine professional action he gloried in it, and he labored through life to elevate his calling in the eyes of men. His fellows recognized this in him, and this was the great reason for his constantly increasing popularity. To conquer shams, to foster science, to expose cant, to teach the truth, to seize the happy moment, to know real worth, to labor always for progress, — these were the great things in life to him.

And when at last, in old age, he died in harness, his ambition unquenched, and his courage firm and unfaltering to the last, the profession and the world felt that a monument in St. Paul's was but a humble tribute to the greatest surgeon of his time.

SIR BENJAMIN COLLINS BRODIE, BART.: A SKETCH[1]

A YEAR ago, after publishing an essay on Sir Astley Cooper, I was asked to write something of Sir Benjamin Brodie. I have done so, and the subject has lent itself pleasantly to the task.

Of Brodie I found soon that this generation knows little; he is read seldom by students and other readers of our medical literature, yet the man was in some ways a great man; not so great, doubtless, as Cooper, fifteen years his senior, but a striking figure in his time; as a teacher, sound and resourceful; as a writer, facile and instructive; as a physician, accomplished and successful; a man of the world, broad, lovable, forceful, cultured.

We say that great men in any walk of life must reflect the spirit of their times — and this was true of Brodie as of Cooper. The latter was the contemporary of Nelson, Wellington, Fox, and Pitt; the former, of Peel and Palmerston, Sydney Smith and Macaulay. Though Brodie lived through the stormy days of the French Revolution, he does not belong, for us, to that age, but to the calmer era that succeeded, when Europe was being reconstructed, and the strenuous work of the soldier was giving place to the labors of the statesman and the philosopher.

[1] Read before the Warren Club, March 28, 1899.

Brodie was the finished product of his time. Society was being reorganized, politics were being purified, and the English people were being prepared for that great wave of altruism and social regeneration which we now know. Science, too, was taking its rightful place in the eyes of men who were beginning to appreciate the great truths taught by Hunter in the eighteenth century; and in all these revivals, with their changed conditions and new interests, Brodie took a prominent and forward part. Not a hero or a genius, but an accomplished man of exceptional talents and catholicity of view, he won and held long the foremost place among English surgeons.

Benjamin Collins Brodie was born in 1783, and died in 1862, and therefore belongs entirely to the nineteenth century, so far as his work in the world is concerned. Like many distinguished Englishmen, he was the son of a country clergyman. In his charming autobiography Sir Benjamin tells of his ancestry and boyhood; and the striking facts are these: that his father, a man of Scotch lineage, was a Whig in politics and a protégé of Henry Fox, the first Lord Holland, by whom he was presented with the living of Winterslow in Wiltshire. There he lived always, and there his children were born and educated. He was the father of many sons and daughters, whom he himself taught; and being a man of broad culture for the time in which he lived, he taught them well and thoroughly. Latin, Greek, English, French, Italian, were their studies; and upon such a foundation of the best literature his distinguished son builded. This was a studious,

methodical, retiring boy, given to solitary rambles, and little addicted to the sports of the day, for which, indeed, his opportunities were small. "Thorough" was his motto; his opinions were his own.

He had eager physical vigor too, though he was small of stature and delicate of frame; and his patriotism flamed out in season. In 1798, when Napoleon threatened invasion, young Benjamin, with his two elder brothers, raised a company of one hundred and forty volunteers. He was commissioned ensign by the king. It was a fine, well-drilled, and creditable body of recruits.

Such a boyhood was in the great surgeon's background; but beyond this he was fortunate in family connections, professional and others, which counted to him for good. His grandfather was the grandfather also of that Thomas, Lord Denman, who was the advocate of the unhappy Queen Caroline, and Chief Justice of the King's Bench later. His paternal grandmother was a daughter of a well-known physician, Dr. Samuel Shaw. One daughter of this lady married Dr. Denman, the Chief Justice's father. Dr. Baillie and Sir Richard Croft had married his first cousins. With such a connection, it is not surprising that young Brodie came to follow some branch of the healing art. He had no "call" for it, but as he wanted a professional career, and his brother Peter had preceded him to London and was studying for the bar, he turned to surgery as his vocation, — not medicine, for he held no university degree. This was in the year 1801.

Brodie was sent to London to study surgery. The choice was made by his father, not by himself. His studies were entered upon faithfully, but without enthusiasm. A long time he felt disinclined for such work. He disliked his fellow-students; and this is a notable fact of his early professional days, that he disbelieved in "calls." In his autobiography he says some interesting things in that connection. He thought, always, that he should have done equally well in the Church, at the bar, or in the civil service. To him it was all a question of thoroughness, of endeavor.

In the early days of medical study those things which offend all sensitive men were especially repugnant to him; and, above all things, he disliked his associates. Indeed, the average medical student of a hundred years ago seems to have been a sorry fellow. Those youths mostly were drawn from the lower middle classes; they had little education or breeding, and were a rough, hard-drinking, boisterous, uncouth crowd, not at all pleasing as comrades to the fastidious young Brodie, the highly cultivated clergyman's son, fresh from the kindly home circle of Winterslow parsonage. But there were compensations for this in other associates — social, rather than professional. Two young surgical friends he had indeed — Crawford and Lawrence — of whom he thought highly, and they lived to justify his regard; and in the world at large men interested him, and the friends he made among them came to mean much to him. This association of his professional life with the interests of the community was typical of Brodie throughout his career; indeed,

the things the man did are much less important to us than what the man was. Such men, living in a community, set their stamp upon their profession.

Brodie's professional training followed the general lines familiar to all well-educated surgeons of his time. The first two years were given to anatomy, mostly; to chemistry, and to some little pharmacology picked up in a chemist's shop. Abernethy's lectures on anatomy were attended, and the school of Mr. Wilson, who taught in Great Windmill Street. From the outset he was diligent and successful, we must believe, — though he tells his own story modestly, — for he won the confidence and regard of his seniors early, and was made their associate and treated almost as an equal when little more than a youth. That period of his life is interesting, and to be dwelt upon if there were time. He did not come in contact directly with the great teachers of the day — John Hunter was recently dead, Cline and Astley Cooper were at Guy's Hospital; but in his second year of study he became a pupil of Everard Home, whose sister John Hunter had married, and so he came to inherit the tradition and the purpose of the Hunterian school.

Mr. Home, afterwards Sir Everard Home, was surgeon to St. George's, and it came about that to this famous hospital Brodie became attached early. There he served his apprenticeship, and there he worked as teacher and surgeon through the most active years of his long professional life. There he was two years as a pupil and six months as house surgeon, when he resigned to teach anatomy in Mr. Wilson's school.

So those four years constituted his work as a student, pure and simple, and as a student he merits no special mention. He became interested; he was always industrious; he early taught and taught well. Anatomy and physiology engrossed him. There are no stories of extraordinary genius for surgery, nor of neglected opportunities and riotous living. He was an efficient, painstaking young fellow, *persona grata* to his superiors.

Brodie's professional life, after the student days, began in 1805, when he was twenty-one years old, and even then, for four years, or until he was twenty-five, he was occupied in hospital work, teaching, and assisting up to the year 1809. During more than half of this time he worked assiduously in the dissecting room and in teaching anatomy; what outside surgery he did was in the capacity of assistant to Sir Everard Home; that work consisted in operating, and in investigations in human and comparative anatomy and physiology — pursuits which were then and for long afterward grouped together. Such studies were fascinating to the young surgeon, and it so came about that he became known first to the professional public as a physiologist rather than as an anatomist.

Then in 1808, at the age of twenty-four, he was appointed assistant surgeon to St. George's. This meant more than appears, for, owing to the frequent absences of Home, who left his patients to Brodie entirely, and to the army service of Gunning, the junior surgeon, a great amount of responsibility was thrown upon Brodie, and, for all practical purposes, he was

acting as full surgeon to the hospital from the year 1808 onward until his retirement from all hospital work in 1840.

During those early years of preparation Brodie's father had died, leaving his large family in somewhat straitened circumstances. Mrs. Brodie, the widow, could live in comfort on her income, but could afford little aid to her sons in their struggles. However, they were all young unmarried men, with some start made, and so their careers were not at all interrupted. Indeed Benjamin was by that time supporting himself, practically — what with his lectures and his association with Home. He lived, indeed, in a small way at a lodging house in Sackville Street, and it was not until 1809, in his twenty-sixth year, that he took a house of his own, in the same neighborhood, put up a door-plate, and began practice in earnest.

Brodie practiced medicine from 1809 until 1862, when he died — a period of fifty-three years. He was a successful man; he came to be the most notable surgeon of his generation; he was everywhere esteemed and honored; he won the highest prizes; he made some important contributions to science and to medical literature; he met with no reverses; and yet as a story his life lacks plot. It is simple, straightforward, uneventful, and for us points a moral only as it shows what one form of success means, and what sort of a man was this one — reputed the most notable surgeon, scientist, and scholar combined that the first half of our century produced.

Let us glance quickly over the tale as it is told by

Mr. Timothy Holmes,[1] and then return to look at Brodie as he was — at his personality, interesting and important; at his habits, his tastes, his methods, his friends; at that thing which we moderns are calling his *environment.*

In his first year of practice Brodie worked hard for small fees, took a few pupils, and lectured on anatomy; from all of these sources his income was about £250 — a very good first year even for our more expensive days. In his seventh year, at the time of his marriage, his income was £1530; in his fourteenth year of practice, when he was forty years old, it was £6500; and in his twenty-fifth year of practice, 1834, when he was fifty-one years old, and at the high-water mark of income, it is stated to have reached £11,000, or something less than $55,000. This is interesting to a student of statistics. Astley Cooper made twice as much twenty years earlier, and some modern surgeons make twice as much. But Cooper was *facile princeps* among surgeons in 1815, and to-day operation fees are incomparably higher than they were in 1834, when a surgeon's income was made up from innumerable small fees, and when operations were infrequent.

In 1809, then, Benjamin Brodie started out with a modest establishment at No. 22 Sackville Street, and sought the patronage of the public. If success is to be measured by pounds and shillings, Brodie was successful, as we have seen, but from the start he did

[1] "Sir Benjamin Collins Brodie," by Timothy Holmes, M.A., F.R.C.S., in "Masters of Medicine" Series. Longmans, Green & Co., 1898.

much more than make money. His autobiography, which is the principal source of our knowledge of his early life, tells modestly of his physiological studies, which were inspired by the recent works of Bichat. This is what he did in the first two years: He wrote a paper on the "Dissection of a Fetus which had no Heart," and this made him a Fellow of the Royal Society in 1810. In the same year he delivered the Croonian Lecture, "On the Influence of the Brain on the Action of the Heart and the Generation of Animal Heat"; he communicated also a paper on "The Effects produced by Certain Vegetable Poisons." These papers won for him the Copley Medal. Of the award, the tale is told that one of the councilors said the medal had never before been given to so young a man; to which Wollaston answered that the author's youth was an additional reason why he should have it; at any rate, there was no further opposition.

About this time Brodie began the long-continued and serious work on "Diseases of the Joints," for which he is best known in surgical annals. Briefly he himself tells the story of how, as house surgeon, he had become interested in a case of what was called "spontaneous dislocation of the hip," due to disease of that joint, and how, in this way first, he was led to study that much-neglected condition. Be it remembered that at this time Astley Cooper was engaged on his great work on the joints, but he took up the traumatic rather than the pathological aspect of joint lesions. It is needless here to go into the details of Brodie's work. Suffice it to say that, after a

long course of dissections and clinical experiments, he came to some definite understanding of the nature of chronic joint disease, especially the differentiation between true morbid processes and what are called "hysterical joints"; that he saw the proper indications for treatment by rest and treatment by movements, and so doubtless his conclusions are justified, when he says, in his autobiography: "I have reason to believe that my labors have not been in vain, and that a great number of limbs are now preserved which would in former times have been amputated as a matter of course."

It is not possible here to elaborate this subject, but this work of Brodie's was indeed exhaustive and important. His first papers were published in the Medico-Chirurgical *Transactions*, — 1813 and 1814, — and were the beginnings of his principal contribution to practical surgery, his great treatise on "Diseases of the Joints."

At this period of his life Brodie gave up teaching anatomy. This came about through the withdrawal of his superior and employer, Mr. Wilson, from such work, and not from his being engrossed himself in other matters. He was still a young man, but he never returned systematically to teaching anatomy, though his labors with Home and his classes in surgery kept him in fresh touch with the subject. He seems not to have regretted this change, for soon his practice and his physiological experiments, together with surgical investigations and writings, engrossed him.

Two other events occurred, important to him, in

these early years of practice. In 1814 he broke down from overwork, and was forced to take a long vacation. In 1816 he married a wife. He was then thirty-two years old and was earning £1530 a year. Brodie was always a prosperous man, and his only grave anxieties, which came at the beginning of his married life, were insignificant enough. He dwells upon them as the only serious anxieties he ever knew, yet they amounted to this only: that he feared lest his bride might not have all the luxuries to which she had been accustomed, he being a poor man.

His poverty did not last long. From the year after his marriage his practice and his income increased rapidly. Cooper began to retire gradually after the year 1815, and, as Brodie himself writes, "some one else was wanted."

The years of early struggle and establishment are the eventful years in most lives. When a man is rich and prosperous, when he drives about in his brougham behind two horses, and is sought after by the great ones of the earth, his biographer finds little to record. So it is with Brodie. He himself recognizes the fact tacitly, for after this his autobiography loses force and movement. He tells anecdotes of men and manners, and philosophizes pleasantly, but his plot fades away into such talk. For us it remains only to collect a few dates, and then to look back at the man himself and see of what sort he was.

Children were born to him, among others a young Benjamin, whose son is the present baronet.

In 1821 he was first consulted by King George IV,

in association with Home, Cooper, and others. The king had a wen of the scalp. Cooper removed it and was made a baronet soon after.

In 1822 Brodie was made full surgeon to St. George's Hospital, on the resignation of Griffiths.

In 1830 he attended the king in his final illness.

In 1832 he was made sergeant-surgeon to William IV, and was continued in that office under Queen Victoria.

In 1834, at the age of fifty-one, he was made a baronet, and became an examiner of the College of Surgeons.

In 1839 he was elected president of the Medico-Chirurgical Society.

In 1840 he resigned his surgeoncy to St. George's.

In 1849 he was president of the Western Medical and Surgical Society of London, which ceased to exist in 1871.

In 1858 he was the first president of the General Medical Council.

The next year he received the distinguished honor of being elected president of the Royal Society, an office never before held by a surgeon. This place he resigned in 1861. The year before this his eyes began to fail him, and for the last year of his life he was practically blind.

He died on October 21, 1862, of malignant disease, originating in the shoulder — probably sarcoma.

Brodie is essentially worth knowing as a type of the best in his period in the evolution of medicine. He came after the great pioneer Hunter, whose teaching

he followed. He preceded the age of antiseptics and the wonderful expansion of surgery that accompanied their discovery and application. So, placed between Hunter and Lister, he cultivated the wisdom of the former and helped prepare the field for the latter. To him the philosophy of medicine appealed more than it did to the rugged Cooper, and though he saw no more clearly than Cooper, he saw more broadly. Both knew that truth is at the bottom of all wisdom. Cooper sought truth because he saw through it the solution of the problem in hand. Brodie, with his cultivated mind and knowledge of men, past and present, felt in his soul that "truth is mighty and will prevail." That fact the lawyers learned long since. On that great conception their courts of justice are founded. It is that which has given the law and its exponents the highest respect of men through all history. To prosecute criminals, to defend property, to draw wills, and to explain the statutes are no more honorable or laudable pursuits, intrinsically, than to save life, to fight contagion, or to study disease. But, save for a few great souls, isolated in the centuries, truth was not the object sought by physicians. The cynic may say that for ages medicine was in the hands of priests — that is a large subject.

Certain it is that with the dawn of science, since men have sought truth through anatomy, physiology, chemistry, and allied studies, medicine has been rising, gradually, to a position of proper dignity, and to few men more than to Brodie do we English-speaking folk owe the debt of gratitude for demonstrating this fact.

It is a fact which was long seen but dimly by physicians themselves. It is not altogether known yet save to the elect, but it has leavened the mass, and is percolating slowly through the crust of ignorance, of charlatanry, of self-deception, which so long have masked the real purpose of our art. It was this feeling for the truth — a feeling so familiar now with us as to be almost axiomatic, I presume — that inspired all of Brodie's work.

I think it was fortunate for him and for us that he did not live in the days of specialism. In his prime men of vigor found time to study science in the laboratory and at the bedside. The great anatomist and physiologist was the great surgeon also. He recognized, as do we, how much easier and pleasanter it is to *study science* than to treat disease, and he noted that the laboratory student prefers to keep out of the arena and plumes himself on his virtue. Indeed, he foresaw the time we live in, of which Holmes makes this note: "That we are here to alleviate human suffering is less recognized now than then." [1]

Brodie did more, even, than seek the truth; he sought it with thoroughness, and so he learned early to grasp it. In the beginning of his studies he had to overcome a repugnance for his subject, and through that very struggle he came the sooner on the meaning of it all — of the interdependence of theory and practice. He spent six years in preliminary study;

[1] Dr. Johnson said of medical practice that it is only "melancholy attendance on misery, mean submission to peevishness, and continual interruption of rest and pleasure." — *Rambler*, No. 19.

but those years did not unfit him for attendance on disease when his time came, and, to crown all, he possessed in a rare degree that *intuition* necessary successfully to treat the sick.

A man's writings are not a key to his character, necessarily, but we must believe that they are so in Brodie's case. He wrote much, continuously, copiously, and on divers subjects. A list of what he wrote would fill several of these pages. Of his work on the joints I have spoken; that was his *magnum opus*, perhaps. He wrote also on genito-urinary disease — an important writing it was. Lithotrity for calculus was what he taught. Bigelow's operation of litholapaxy was not then perfected. No one more than Brodie — no one, that is, of the greatly successful surgeons — recognized the dangers of sepsis in cutting operations; and he was never an advocate of the knife except as a last resort.

And there were his numerous fugitive articles, essays, and published addresses. He made a great many scientific addresses, which are to be found in his collected works.[1] There are many introductory discourses to his students, and addresses as president of the Royal Society, and such essays as "On the Effects of Strangulation," "On the Mode of Death from Drowning," "On the Mode in which Death is produced by a Lightning Stroke," the Hunterian Oration of 1837, essays on "Homeopathy," on "Quacks and

[1] "The Works of Sir Benjamin Collins Brodie, Bart., D.C.L.," etc., with an autobiography, collected and arranged by Charles Hawkins, F.R.C.S., in three volumes. London, 1865.

Quackery," on the "Use and Abuse of Tobacco," "On the Establishment of Special Hospitals," etc. Some few of these numerous publications are commonplace, but most are valuable and are interesting to us to-day.

Brodie's writings reveal him, too, as the many-sided man he was — physiologist, surgeon, philosopher. That publication of which his biographer speaks most — and indeed the work of which he himself thought much — is his series of essays entitled "Psychological Inquiries," the first part "intended to illustrate the Mutual Relations of the Physical Organization and the Mental Faculties"; the second part "to illustrate Some Points in the Physical and Moral History of Man."

As the titles suggest, Brodie has embodied all his best thoughts on life in these essays. A *critique* or a bare synopsis would be impossible here. The essays are indeed charming and abundantly worth reading. Constructed on the lines of Bishop Berkeley's "Alciphron," they combine the manner and thought of many other writers, — of Cicero in *De Senectute*, of Dr. Brown, and our own Dr. Holmes, — yet they are essentially Brodie's own in construction, in style, and in method of reasoning. The optimism of the man shines forth continually, as well as the kindliness of the physician and the wisdom of the philosopher. He believes firmly in man's capacity for indefinite development; he asserts that the longer he lives, the more thoroughly is he convinced by experience that the good in this world predominates vastly over the evil. His

axiom is that "the existence of one's own mind is the only thing of which one has any positive and actual knowledge." And through it all, and differing indeed from modern thinkers, he treats the question of the existence and creative energy of God as settled.

That these disquisitions should have been written by Brodie is an interesting and curious commentary on the man. One looks for an explanation of it, and finds it at once in his often repeated assertion that a liberal training in letters is the best preparation for the medical education.

Brodie had no Boswell, as had Astley Cooper in his Bransby, but he was better worthy of one. His appearance, manner, private life, and conversation must have been worth recording, if one may judge by a few poor glimpses. To his junior followers he was a demigod. Charles Hawkins, his young associate, edited his works, but was "unworthy to write the life of so great a man," he said. Even Timothy Holmes, writing thirty-six years after Brodie's death, speaks of him with reverence, as the one great man to be reckoned with Harvey and Hunter. Now Hawkins and Holmes knew Brodie; they were educated in the Brodie tradition, as we in Boston were educated in the tradition of Bigelow and the "elder Warren." To Hawkins and Holmes Brodie was a very real living force; but, alas, to us now the volume of that force is easy of measurement, and already his deeds have ceased to live.

The physical personality of Brodie meant less than is often the case with great men. He was small of

stature, lithe, active, keen, winning, with a something that secured and held warm friends, but without that rare quality we call magnetism — to hold and sway a crowd.

In his younger days he fell in with many interesting and distinguished men, inside and outside of his profession, and such friends he cultivated always. At first there were the associates of his barrister brother, Peter, whose Academical Society he joined; in it were Merivale, Wray, Stoddard, the future Lord Campbell, and other such. He even wrote some for Baldwin's *Literary Journal.*

Then in his hospital days he was introduced to Sir Joseph Banks, president of the Royal Society, and in 1810, at the age of twenty-seven, he became a member of that distinguished body. So he knew well and mentions Herschel, Humphry Davy, Wollaston, Young, Hatchett, Wilkins, Marsden, Rennell, Henry Cavendish, Blagden, Abernethy, Carlisle, and many others who are far removed from us.

There were, too, his many social duties, which Brodie kept up, though he says they were in no way allowed to interfere with his professional work. He tells of being very much engaged "in dinner society," as his acquaintance was pretty large, but that, being of temperate habits, he always returned home at an early hour.

Brodie had a traditional interest in and loyalty to the Fox family; so that it is not surprising to find him an intimate visitor at Holland House and a member of that delightful circle made famous by Macaulay,

and so well known to us through the writings of Macaulay's biographer, Sir G. O. Trevelyan. He speaks warmly of Lord and Lady Holland, and we cannot but think that the connection was of value to him in his early days of practice.

If one had time, it would be interesting to quote at length the pleasant things he tells of all these folk. It was a very live and earnest gathering of men and women, and one does not hear from such as Samuel Rogers, Sydney Smith, Allen, and Macaulay that sort of smug criticism by a sham Bohemia which is not unknown to some gatherings of the present day.

Indeed, a careful reading in these pages of Brodie's autobiography, with appropriate excursions into neighboring fields, as the context suggests, would give us a delightful study of the methods and manners of English life in the first half of the last century. I know of no scientific man whose career seems to be in such close sympathy with the life of his time. In reading of Harvey or Hunter or Cooper one feels that they all might have belonged equally well to the fourteenth as to the seventeenth, eighteenth, and nineteenth centuries. They dwelt apart, in a little world of their own, and could not have been companions altogether agreeable to live with. With Brodie it is all very different: one feels on good terms with him at once; his atmosphere is not in the least rarefied; he was a person of modest and kindly spirit, ignorant of jealousies, and in charity with all men.

And after all is said, what was it that made Brodie such a power in his generation? I think it was that

he did well all those things that he found to do. He was a successful teacher; he prepared his lectures carefully; he was always on hand; he went straight to the point; he won and held the attention of his pupils. They went to him for knowledge, and they were never disappointed. Nothing connected with his calling was small and insignificant to him. Out of the veriest trifles he gathered something of human interest, and thus held it up to his hearers. He was a convincing writer. Though a firm believer and practicer of original investigation and observation, and so not a man of text-book knowledge, he was always a great reader of good literature, and was thoroughly versed in the best work of his profession. He attended scrupulously to the work in hand, and undertook nothing that he could not perform. At the comparatively early age of fifty-seven he retired from the hospital, not because he was infirm or beyond work, but because an engrossing practice and the numberless calls upon his time led him to feel that the interests of the hospital would thus best be served. In middle age and with advancing years he was constantly receiving high honors from home and foreign scientific bodies, and was in demand especially as a presiding officer. In this capacity he served diverse associations, most conspicuous of which were the Royal Society and the Royal Medical and Chirurgical Society. With us the functions of a presiding officer seem to have become insignificant enough, but with Sir Benjamin Brodie the position was no sinecure; he believed in debates, and encouraged discussion — that one thing which, rightly carried on,

is the life of such meetings. And those meetings were largely attended. He cut short prosers, he suggested new lines of thought, and was great indeed when, the talk failing, his own chance came to sum up and elucidate the whole matter. There was always discussion when he presided. He would talk if no one else would begin, and the extent of his information, both general and minute, on nearly all subjects was a constant wonder and delight. He rarely missed his meetings, and he was familiar with the subject in hand always.

It is in such pursuits that we must fancy Brodie to ourselves: as a leader and teacher of his fellows, as the great type and exponent of our art to our fellowmen. Forty years ago the *Duke* meant Wellington to an Englishman; the *Great Surgeon* meant Brodie. He grew to be an exemplar. In all things he saw something of good. From all men he extracted the best. In learning he found the joy of living, and he met death with a perfect courage.

To such a man — patient, industrious, brilliant, wise, sound scholar and lucid teacher — his friends dedicated the Brodie Medal and inscribed these lines of Lucretius:

> "E tenebris tantis tam clarum extollere lumen,
> Qui primus potuisti, inlustrans commoda vitæ." [1]

[1] "De Rerum Natura," iii, 1, 2.

JOHN COLLINS WARREN[1]

AMONG the men of our grandfathers' generation, few led more steadily laborious and useful lives than did John Collins Warren. He was born in Boston in 1778, on the 1st of August, the eldest son of that interesting John Warren, who served in the Revolution and founded the Harvard Medical School.

If ever there was a man blessed, or cursed, as you choose, with the New England conscience, it was John Collins Warren. His father wanted to keep him out of medicine, and he himself had no natural liking for it. We have it over his own signature that he was indolent and hated study; yet, once having put his hand to the plow, he never turned back, but devoted himself heart and soul, steadily, faithfully, without enthusiasm, to his profession, for more than fifty years. And he certainly had a very marked influence upon general practice in Boston, upon teaching at Harvard, upon surgery at the Massachusetts General Hospital, and upon his professional brethren in this country. Intellectually he was unlike any of the other early American surgeons, though in certain elements of training and experience he might be compared to Valentine Mott of New York. Like Mott, he was the son of a doctor, he was born and reared in an old, well-established community, and in a medical atmos-

[1] Read before the Johns Hopkins Hospital Historical Club, February 9, 1903.

phere; he was thoroughly educated for his work, and he spent his life in the midst of congenial surroundings, social and professional.

We probably know as much about him as we could know about any man of his temperament; for he had a steady appreciation of his own position in life and took copious biographical notes of his own career; those notes were elaborately edited by his brother soon after his death.

Inheriting a strong position from his distinguished father, he had a constant and proper pride in supporting it, and the combination of a sound understanding, wide culture, laborious industry, and eager grasp of opportunity, together with the fortunate circumstance that for many years he met with little serious professional competition, secured for him in early life the unique position of surgical autocrat of New England.

His own biographical notes contain abundant material for a delightful memoir of his times, if only they had fallen into the hands of a Trevelyan or a Lang. Unfortunately, his editor was too much bent on eulogy for the popular success of the book. In spite of these drawbacks, we have a picture of a very important and very full career, and of a man familiar in his day to doctors throughout the land.

Warren's youth was passed in surroundings which seem ancient to us now. His grandson and namesake has given us a charming sketch[1] of those old days,

[1] "Reminiscences of an Old New England Surgeon" (*Maryland Medical Journal*, 1901, vol. 44, p. 45), by John Collins Warren, M.D., F.R.C.S.

taking his material from his ancestor's own notes, which run: —

"At the period when I left college and became an inhabitant of Boston it was thought necessary to undergo the operation of a barber half an hour every day. This consumed much time, besides the horrid consequences of carrying on one's head a quantity of curls, pomatum, flour, and the long cue or heavy club.

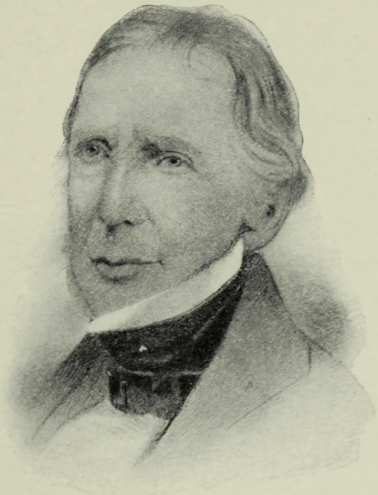
"The dress at that time was a colored coat with metal buttons, usually yellow; colored waistcoat, short breeches, buttoning at the knees; long boots with white tops, and when riding on horseback a pair of leather breeches instead of pantaloons, of drab cloth.

"These yellow breeches were daily cleaned with yellow clay, which required that the coats should never be brought in contact with them. Then a short ruffle at the breast and about the wrists, a white cravat, filled out with what was called a pudding, the use of which, from the effect of habit, could not be dispensed with for some years.

"Cocked hats were very much worn at the time, but not by the young.

"Gentlemen of a certain age wore wigs, which were sent to the barbers once a week to be fresh dressed, so that on Saturday night we saw the barbers' boys carrying home immense bundles of wig-boxes as a preparation for going to church on Sunday.

"Physicians who had much business in those days rode on horseback. Riding in a chaise was very rare, and in a four-wheeled carriage still more so. My father rode on horseback till a few years before his death.



John C. Warren

"Dr. Lloyd generally drove a very fine horse, and Drs. Jarvis and Whipple were famous for beautiful saddle horses and the elegance with which they rode.

"Large parties opened at 7 or 8 o'clock in the evening, and were much more formal than at present. A friend of mine told me that he saw me dance a minuet in 1796 or thereabouts, and that this was the last time he had witnessed this dance in Boston.

"Persons of a certain age were treated with a degree of deference now wholly disused. In fact, one of the great traits of the manners of the present time is the manner with which young persons are accustomed to treat persons older than themselves.

"Gentlemen's dinner parties began early and ended late. The great care on the part of the host was to present to the guests as much ordinary wine as they could be made to drink, and then to bring forward in succession a variety of old wines, each having a character a little better than that which preceded. All of these had some remarkable history connected with them, the details of which constituted an important part of social discussions.

"On the whole, the dinner parties of those days must be looked on with disgust; for not only was the quantity drunk sufficient to make irreparable inroads on the physical organization, but this indulgence led to coarse extravagance and thought, and the conversation at a dinner party, if taken down by a stenographer and presented to the party on the morning following, would have filled them with shame and regret."

Warren was intended by his father for a mercantile

life, but the suitable opening not immediately presenting itself after he left college, he passed a couple of years at French and the *pretended* study of medicine, as he himself says. Then he went to Europe and settled down to serious work — that was in 1799 when he was twenty-one years old. His course there was much like that of many other young American students of the time. London claimed him first, where he became a pupil of William Cooper, and later of William Cooper's nephew, Astley Cooper. The elder was an able, conservative surgeon, testy, and ignorant of all things beyond his little island — he was the antipodes of his brilliant, generous, popular nephew. Warren secured a dresser's position at Guy's Hospital, — it was merely a matter of money down, — and served at such work and dissecting for something more than a year. Then he went to Edinburgh for a year, where he received his medical degree, and then for a final year to Paris. In the two latter places he studied hard — going in for chemistry, general medicine, and midwifery, as well as anatomy and surgery. He lived in Paris with Dubois, Napoleon's distinguished surgeon, and studied chemistry with Vaquelin and Fourcrois; anatomy with Ribes, Sabatier, Chaussier, Cuvier, and Dupuytren; medicine with Corvisart; and botany with Desfontaines. That was a brilliant gathering for the edifying of a young gentleman from Boston. He says that the French students were green from the Revolution, for the most part a rude and vulgar set of people, who made him much trouble first and last.

In the autumn of 1802 Warren came home, by the

way of England, and on arriving in Boston, found his father in poor health. In order to relieve him he immediately assumed a great part of his practice. It is said that at this time the elder Warren had a larger private practice in Boston than any other physician has carried before or since. At any rate, the son found himself almost swamped by these new duties, and tells in his diary that frequently during the year he would make fifty professional visits a day. Allowing for a working day of sixteen hours, this would give him about twenty minutes to each patient, not counting the time consumed in traveling; and, as much of his work was midwifery, we must think of him as a young man with an extraordinary burden to bear. It is recorded of both the Warrens that they acquired a great facility in dealing with patients and a remarkable intuitive skill in the diagnoses of the day. Their visits were purely business-like. They would take up the case at once, wasting no time in gossip, and, the required duty being completed, would promptly withdraw.

This sensible method, so unlike that usually followed by their colleagues, gained for them the respect of their patients and saved hours of valuable time daily.

The fortunate young Warren had other advantages to his hand — not the least among them an opportunity for teaching. His father was finding that that work and the ride to the Harvard School, in Cambridge, were almost more than he could bear, so the son was set to work to relieve him. The Harvard School was still in its infancy. Its distance from Boston made it difficult of access for students living in the city, and there was,

of course, an absolute lack of clinical material in Cambridge. At about the time of Warren's coming home, James Jackson also appeared upon the scene, and we find the names of the two men associated thereafter for more than fifty years. They and their contemporaries were joined by the elder Warren, and by Dexter, professor of chemistry, in the effort to transfer the school to Boston, and after years of rather bitter conflict with Waterhouse, professor of practice, they succeeded in effecting the change in 1810.

Those years between 1802 and 1810 were important years to Warren in many ways. He married a wife, to begin with, in 1803, a daughter of Jonathan Mason, and began the rearing of his many children. He was active in all sorts of literary, social, and scientific enterprises. With John Lowell, J. Q. Adams, Kirkland, Quincy, Jackson, William Emerson, and others, he started a Natural Philosophy Society; with Gardner, Emerson, W. S. Shaw, Buckminster, Tuckerman, Jackson, and others, he established the Anthology periodical and the society which grew into the Boston Athenæum; with Jackson, Dixwell, Coffin, Bullard, and Howard, he formed a Society for Medical Improvement. In 1806 he was made adjunct to his father in the chair of anatomy and surgery at Harvard, and he succeeded to the full professorship upon his father's death, in 1815.

Warren's name will always be associated with two important facts. One was the founding of the Massachusetts General Hospital; the other was the introduction of ether anæsthesia. These two events were

separated by an interval of twenty-five years, but around them both are grouped nearly all that is conspicuous in Boston medicine during the first fifty years of the last century. There were other men, of course, concerned with both events — some of them concerned more intimately than was Warren; but Warren was part of both, and for such distinction is known to us.

Before the establishment of the hospital, his constant occupation as a teacher and general practitioner led him into lines of research less strictly surgical than what we know of his work in his later years. In 1809, while still comparatively fresh from European teachers, he published a valuable paper on organic disease of the heart, a subject which until then was little understood in this country; and in 1811, together with Jackson, Gorham, Jacob Bigelow, and Channing, he assisted in founding the *New England Journal of Medicine and Surgery*. This publication was ably edited and in 1828 was united with another, under the title the *Boston Medical and Surgical Journal*, which flourishes to-day.

As a writer, Warren was lucid and strong. He had a great many things to say, and he said them well. His belief was that, as yet, the profession in America was too young and inexperienced for original work of moment. He recognized the inadequate training of the great mass of his fellows, and his conviction was that their first need was to acquire and absorb the learning of the old world. This belief he preached with pen and by word of mouth. He was one of the

first to see the true functions of a medical school, and he followed other wise men in insisting upon the establishment of hospitals. His lectures were carefully prepared and systematically delivered. He was clear and instructive without being eloquent. He lacked the charm and magnetism of his father, and of his uncle, General Joseph Warren, in public speaking, but he was more learned than they and ably carried on the work which his father had well begun.

The Massachusetts General Hospital was slow in getting started. So long ago as 1810, Jackson and Warren organized the movement for its foundation, — a movement which had been in the air for many years, — if, indeed, it may not be regarded as the direct outgrowth of that great military hospital in Boston, over which old John Warren went to preside in 1777. When that old institution disappeared after the war, the elder Warren missed it sadly, and in all his later life essayed to promote a proper substitute.

At last, on the 10th of August, 1810, these various desires of wise men in Boston found voice in a circular letter signed by James Jackson and John C. Warren, in which they asked their fellow-townsmen for subscriptions to a "hospital for the reception of lunatics and other sick persons." Promptly the good work was taken up by prominent men of the laity, — James Bowdoin and fifty-five others, citizens of Massachusetts, — incorporators under the title "The Massachusetts General Hospital," and the enterprise progressed slowly and substantially, until finally, in September, 1821, the first patient was received. Warren was then

forty-three years old, and his father had been six years dead, without seeing the long-awaited hospital an accomplished fact.

It is to the two men, Jackson and Warren, that we owe the Massachusetts General Hospital, and to this day their names, and the name of Bigelow, are the ones most closely associated with it. From the outset, it was a general hospital, where acute diseases were received, though from the beginning its wards for the insane were removed to a distance, located in Somerville, and named after John McLean, who had contributed towards the foundation sums amounting to about $120,000.

Until the establishment of the general hospital, there was little opportunity in Boston for study and experimentation on surgical lines, but with the hospital's advent Warren's career expanded in a manner unknown even to his father, and in his own careful, methodical, and painstaking manner he proceeded to organize a routine for the surgical staff, in a fashion which to this day has left its impress upon the practice of Boston. Warren was very able, but, unlike many other able men, he was a man of detail. His whole life seems to have been schematic, and his hospital practice was made to correspond with the rest of his life. We have seen that he was keenly alive to his own dignity and position, and this characteristic, which sometimes was found irritating to his equals in the outside world, was made to serve a useful purpose within the hospital walls. From the outset, his department was conducted on lines of almost military

discipline. His colleagues were formally addressed and consulted, and the nicest punctilio was observed between them. His juniors on the staff were required to hold towards him and the other senior surgeons a proper distance and respect; the house staff, as we should call the young graduates who act as assistants, were enrolled as "house pupils," were addressed as "Mister," and were not permitted to assume the title of their doctor's degree until the end of their year of service. Their duties were strictly those of the humblest of assistants; they were given no responsibility beyond the slightest, and their labors consisted largely in the careful writing, at dictation, of voluminous records, and in aiding in the dressing of wounds. To some extent, too, they did assist at operations, though often this work was done by one of the surgeon's own colleagues. In their turn, the nurses and the servants of the hospital were relegated to the humblest of positions. The result of all this was a most admirable machine, which, once established, ran of itself; and in some measure still runs on, much as it was set going eighty years ago.

The position of a surgical teacher, who is at the head of a hospital also, on whom students wait for their instruction, and young doctors for their orders, is almost unique in civil life. The college president or the great merchant is less of an autocrat in his own field. The colonel of a regiment or the captain of a battle ship alone surpass him; and we must believe that Warren, with his temperament and opportunities, developed to the full the possibilities of the situation.

He was an able surgeon of the painstaking type. In those days all operations, even the most inconsiderable from our point of view, were serious matters. Without antiseptics, there was always a probability of serious infection following, and without ether there was always intolerable pain. So the knife was used sparingly and of dire necessity only, and he was thought the skillful surgeon who could avoid it longest. Warren prepared with the greatest care for each operation. He read up his authorities, he consulted his notes, he studied his case, and he practiced on the dead subject. By such practice he became rarely facile, but he never presumed on his facility. His work on the living was done methodically and with minute pains, to avoid hemorrhage or damage to structure. His work was thoroughly done, and it was well done. In all the minutiæ of dressings, bandaging, and apparatus he was a past master. He held that, so far as possible, wounds should be closed without stitches, and his dressings were works of art. Indeed, in such work he set the pace, and the rare beauty and method of bandaging and apparatus in Boston hospitals are conspicuous to this day.

In one respect, his admiring brother and biographer does him an injustice, for he tells of his brilliancy in diagnosis and how he would form his opinion at a glance. For the great majority of common lesions this was doubtless true, but it is hard to believe that a man of Warren's careful and accurate mind would give way to the temptation of what we call "snap diagnosis," especially in those ancient days, when

instruments of precision were lacking, and the science of pathology was just struggling into life. We have copious notes of his clinical remarks, made at the meetings of the Boston Society for Medical Improvement, and such remarks leave us with a feeling that he came to his conclusions only after careful thought and the exhaustive comparing of conditions.

About the time of the hospital's founding, Warren was at the height of his career. He had always been rather delicate in health, and it had been his constant care to guard a chronic dyspepsia, to have his body in condition, and to keep the machine in good working order, as we say. Yet he was a laborious man. It was his habit to rise early on winter mornings and breakfast by candle light; then he went out and made professional visits until one o'clock, when he dined, giving himself about ten minutes for that function; he saw patients until two, when he lay down for an hour's rest. In the latter half of the afternoon he made further visits, supped at seven, and spent his evenings until two o'clock in the morning at his books and in writing. On hospital and lecture days his labors were still further prolonged. It was not an easy, self-indulgent life.

With all his care and method, Warren was not a timid operator. His amputations were bold and brilliant; he removed cataracts with great success; he taught and practiced the operation for strangulated hernia — the first surgeon in this country to do so, and against strong professional opinion here; he introduced the operation for aneurism according to Hunter's

method. His excisions of bones for tumor, especially of the jaw, became famous and are classics — for are they not recorded in volumes of the *Boston Medical and Surgical Journal?* In 1837, when fifty-nine years old, he published his *magnum opus*, "Surgical Observations on Tumors," a thick octavo with plates — a great collection of cases and remarks, interesting and instructive to-day. But all this gives only a faint idea of his ceaseless literary activity. He was always writing; reports, memoirs, essays, lectures, poured from his pen. It was a fluent pen, and had behind it a brain stored with keen thoughts and abundant information.

His extraprofessional interests were multitudinous. Few men have felt so constantly the burden of their responsibilities to the community. He was like an officer on dress parade, or like a careful father in the presence of his young children — always punctilious about appearances. He felt it must not be said that a man of his eminence or importance ever yet set a bad example or appeared to disadvantage. So he was forward in good works, and had a hand in whatever was going. He was dogmatic and final in his decisions and explicit with his advice. In matters surgical his word was law for many years. It was not until his old age, and with the advent upon the scene of another strong, young, and aggressive man, that his power began to wane.

With his own advancing years he saw his son, J. Mason Warren, also beginning to gain the public confidence, and so he found time to devote himself

more to work outside of his profession. He was always greatly interested in comparative anatomy and paleontology. He was able to secure, among other trophies, the most perfect skeleton of the mastodon which exists — the monster is still preserved in the old building on Chestnut Street which has been known for sixty years as the Warren Museum. All through his life he devoted himself, like Hunter and Cooper before him, to the collection of anatomical specimens. This collection, together with the treasures of the Medical Improvement Society, passed years ago to the Harvard Medical School and formed the nucleus of the fine "Warren Museum" of that institution. He became a convert to total abstinence in middle life, and was for many years president of the Boston Society for the Promotion of Temperance in the use of alcohol. He was also president of the Natural History Society of Boston, and was an active member of the Agricultural Society. An interesting organization for the promotion of scientific and literary pursuits was founded by him; it included in its membership many of the most eminent and scholarly men of Boston, and was at first known as the "Warren Club." Under the name of "The Thursday Evening Club" it flourishes to this day, with a history of unbroken excellence and interest, and at the present writing is presided over by the grandson of its founder.

Warren's acquaintance with the profession in this country and in Europe was extensive. He was more given to traveling than was the wont of Bostonians of his day, and he made an extended trip to Europe, when

in middle life; renewing old acquaintance, seeing society, — indeed he was present in London with his family at the time of Queen Victoria's coronation, — and visiting the homes of science at the fountain head.

He was prominent in the establishment of the American Medical Association, of which the primary purpose was the elevation of medicine in practice and in teaching, and he was one of its early presidents. Of all these things we have the story admirably told by himself in his published biography.

Then there was that other great event with which his name is most conspicuously connected, — the first public use in surgery of ether anæsthesia. That was in October, 1846, when he was approaching his seventieth year; an age which we are not wont to associate with great and daring enterprise in affairs. It is needless here to enter upon that interesting and confused chapter of American surgery. Suffice it to admit, as Jacob Bigelow admitted years afterwards, that to Warren belongs the credit, in his old age, of allowing his name and position to stand sponsor for this courageous and revolutionary experiment. Warren himself was too near the end of his career to benefit greatly by anæsthesia in surgery; but in some measure he saw its significance, and wrote about it and championed its uses always.

The old man lived on until 1856. Fifteen years before his death his wife died, leaving him with six grown children, and two years later he married a daughter of Governor Thomas Lindall Winthrop, who also died before him.

He continued busy almost to the end of his life, especially with his writing. His last surgical paper was published in May, 1855, just a year before his death, which closed a brief and painful illness.

His real work had been done long since, however. It is not a life which lends itself readily to eulogy. It was not full of striking events and dramatic incidents. Except for the ether business no event stands out conspicuously; and in that he but lent his name, as, indeed, but for him some other might have done. But it was his long and useful career that made him eminent: his services in helping to found a great hospital, his establishment of sound surgical methods, his correct and methodical teaching, his faithful searching out of the truth, his insistence upon drill, his contempt for the brilliant superficial. All these things were very important, and among us helped to set a new standard, up to which we have been growing ever since. He was indeed a man whose work our community could ill have spared; and though he was succeeded by the meteoric Henry J. Bigelow, the younger man would have found for his endeavors a very different field, had it not been so carefully and faithfully tilled through toilsome years by Warren.

JACOB BIGELOW: A SKETCH[1]

THE two most conspicuous names in Boston medicine of the last century are those of Jackson and Bigelow. Of the former, this society heard something a few years since from my friend Dr. Osler. The Jacksons, father and son, — the son cut off in his early youth, and memorialized by his distinguished father, — fill a unique place in our annals. The Bigelows, father and son, both lived long and active professional lives, their working years covering in all more than eight decades. To the younger generation, the distinguished son, surgeon and teacher, Henry J. Bigelow, is the better known. But I doubt if in future annals his fame will eclipse that of his father.

Recently, we have received a biography of the younger Bigelow from the pen of his colleague, Richard M. Hodges, — to me one of the best medical memoirs known. The story of the *father's* life has never been fully written. Obituary notices, and a brief laudatory sketch by a layman friend we have, and his own writings. From such insufficient data I have attempted to collect and compress into a short paper what little I may of this distinguished man.

What is it that he did? On what does his fame rest? Why do our seniors still name him with respect and almost with reverence?

[1] Read before the Johns Hopkins Hospital Historical Club, October 14, 1901.

Men who knew him, tell this of him — He was a wonderful old man. His mind was alert to the very end. He was full of wit, humor, and satire. He was wise, acute, profound. He was one of the ablest practitioners we ever had.

But there was more than this in it all. What the man did impressed enormously the community in which he lived, the source of the impression being often almost unrealized.

The story of his life, briefly and simply related, is a stimulus in itself, and tells us of the development of medicine and scientific thought through many of the transitional formative years of the century.

Jacob Bigelow was born on the 27th of February, 1787, and died on the 10th of January, 1879, nearly ninety-two years old. His life embraced all the greatest events of our country's history — from the adoption of the Federal Constitution, through the Reconstruction days. And no man more than he grasped the meaning of all that wonderful era. Born at a time of political expansion, he came to know personally all the foremost figures of the age among us. John Adams complimented him, Thomas Jefferson corresponded with him, Daniel Webster was a fellow-townsman, Lincoln and Grant were familiar to his riper years; and though with politics he never had active concern, he was always an appreciative student of national development, and in his place was an aggressive and liberal promoter of reforms — municipal, social, educational, and scientific.

He was of New England ancestry. His great-great-

great-grandfather came from England about 1640 and settled in Watertown, Massachusetts. In that vicinity the family always lived. His father, Jacob also, was a Congregational minister in Sudbury.

The younger Bigelow's childhood was passed in the country at farmwork and scant schooling. Painfully, his father was enabled to send him to Harvard College, where he was graduated in 1806.

During these early years, he was not slow in the pursuit of useful knowledge. Nature always charmed him, and in the study of her mysteries he was an eager scholar. Flowers, the succession of crops, the building of the trees, the changes of the seasons, meant always more to him than to the average, simple, country lad.

In college he was not unknown. In his brief autobiographical notes, which end with his middle life, he tells us that he was a member of a "Theological Society, which was very good; a Porcellian Club, which was very bad; a Phi Beta Kappa Society, intended to be composed of the best scholars; and a Navy Club, which was above suspicion as containing the worst." He was the poet of his commencement day.

Like Astley Cooper, Bigelow had no special "call." Beyond the fact that he had an inborn love of nature, there was nothing to lead him to scientific pursuits. The choice between law, theology, and medicine exercised him not a little, and he tells us that his opinions were at last confirmed by the anatomical lectures of one of the earliest and most forceful surgeons of our country, John Warren.

Were it not for wandering too far afield, it would be interesting here to relate Bigelow's impressions and opinions of that distinguished man, the first of a well-known family of Boston surgeons; for he used often through life to speak in glowing and delighted language of the great fluency and charm with which Warren lectured.

On the choice of a profession, Bigelow has many interesting things to say; and, in his later years, contrasts eloquently the great range of pursuits which became open to aspiring youth, as compared with the narrow things of his boyhood. "Few young men," he says, "would then have cast their fortunes on the uncertain chance of finding occupation and livelihood in the almost unexplored paths since successfully pursued by multitudes of educated aspirants — in the capacities of engineers, mechanical and chemical manufacturers, artists, authors, editors, lecturers, and teachers of the higher class. Is it not possible that future learned professions will spring up for the future wants, luxuries, and perversities of mankind? Why should not cookery, which caters to the gratification of one sense, take its place as a fine art by the side of music and painting; and why should not a refined and cultivated anæsthesia be so varied in its applications and degrees as to exempt mankind from their griefs and grievances by an artistic application?"

In 1806 the status of medical education in this country was almost elementary. Aside from the New York, Philadelphia, and Harvard schools, there was no medical college of high standing, and even they offered

the shortest of courses to their matriculants. Indeed, it was not until 1810 that Harvard, following the example of the older schools, granted her graduates the doctor's degree.

But Harvard, and a residence in Boston, were beyond the reach of young Bigelow on his leaving college. So one year he spent in Worcester as tutor and student before matriculating in the medical school of his Alma Mater. There the professors were then but three — Warren, Jackson, and Waterhouse.

Bigelow came, then, to Boston in 1808 to attend the lectures of the medical professors, entered as a pupil the office of Dr. John Gorham, and eked out his scanty income by teaching in the Boston Latin School. He became a student of science while continuing to broaden his familiarity with the ancient classics.

One year only he passed in Boston — then to Philadelphia, in 1809, for the lectures of Rush, Wistar, Physick, Barton, and Cox, and the doctor's degree.

He was twenty-three years old.

From the outset, Bigelow showed characteristics familiar enough among American youths — ambition, courage, confidence in himself, adaptability to his surroundings, versatility, a keen sense of perspective, humor in its best sense, and an inexhaustible capacity for work. When funds from home failed him, during his medical course, he took to teaching. To bring himself early before the professional public, he took to writing, and secured the handsome Boylston Prizes in four successive years; indeed, it began to be said that the Boylston Prize was instituted for Bigelow's

benefit. Coming to Boston penniless, unknown, without friends or connections, he cultivated from the outset the best among his contemporaries and was an early member of their social, professional, and literary gatherings. Among these men, friends of his youth, were: Alexander Everett, a brother of Edward, George Ticknor, H. D. Sedgwick, Nathan Hale, Edward T. Channing, and William P. Mason.

So well known had he become, so promising seemed his career, that within two years the elder James Jackson chose him as his associate in practice. Dr. Jackson had recently been appointed professor of Theory and Practice at Harvard.

Early there became evident in Bigelow a facility in the handicrafts which was equaled by his brilliancy in intellectual pursuits only. That he gave himself largely to the subjects of therapeutics and internal medicine has always been an interesting fact. He would doubtless have succeeded as a surgeon, as did his distinguished son. He was a born artist, artificer, craftsman, mechanician, and inventor; and there has probably never been a man better equipped by natural endowment for success in all branches of the healing art. So far as appears he never had any regular instruction in drawing or mechanics, but qualified for these pursuits by persistent personal inquiry and the exercise of his natural genius.

When occasion came for illustrating his "Medical Botany" with colored engravings, and before modern methods of lithographing were invented, he himself devised a means of illustration which proved both prac-

tical and beautiful. When he wished for drawings and models for his lectures as Rumford professor, he knew how to make them. When he was called upon to lay out the plan of Mount Auburn Cemetery, he proved himself an ingenious and practical landscape gardener. He was wont to appear in every workshop, garret, and cellar in Boston, where artisans or mechanics would grant him entrance and answer his questions. He knew what was done and how done by smith, glass-blower, clockmaker, type-caster, printer, molder, and engraver.

At the age of twenty-five, when less than two years in practice, his extra-professional activities were punctuated by an election to the Anthology Club. Of course he joined the Massachusetts Medical Society, and was early honored with an election to the Massachusetts Historical Society, and the American Academy of Arts and Sciences.

In 1812, too, his interest in the study of botany and his appreciation of its popular possibilities led him to give a course of public lectures on botany in Boston, under the patronage of John Lowell.

Bigelow often said what has been said by many other distinguished and successful men, that a professional man should have a hobby. I suppose his own hobby was botany; though, indeed, he rode many little hobbies besides. At any rate, to botany first he betook himself, in no amateurish fashion, and studied, and lectured, and wrote books. "Florula Bostoniensis" was one of them, a volume well known to our grandfathers; a simple, charming, comprehendible English book,

bringing nature and fields and forests and flowers nearer to simple minds.

Now these studies of the young Bigelow brought him many friends near home and distinguished correspondents from abroad. Such were: Dr. Henry Muhlenberg of Pennsylvania, the Abbé Correa de Serra, at that time Portuguese Minister at Washington, perhaps the best cultivated man in America — kindly, learned, much acquainted, widely known in science. And there were also such correspondents as Sir J. E. Smith, De Fontaine, Jussieu, and De Candolle.

So Bigelow began to be known among the wise men of Europe, when he was not yet thirty, and, being no pedant, began to be liked among common folk at home. His practice among them spread, and Harvard College appreciated him and made him a professor.

In 1815 he was appointed lecturer on materia medica and botany; and in 1817, when he was thirty, they changed his title to professor, and made him the colleague of James Jackson, J. C. Warren, John Gorham, and Walter Channing. He held the chair for forty years.

Many writers have observed that a man's most interesting years are his early, formative years; and novelists have made use of this fact. But it was not altogether so with Jacob Bigelow. While he was poor and young, strenuous and ingenuous, he was an interesting figure; but I hope to show that he remained an interesting figure, rich and old, still strenuous and wise.

To tell much of those early years, there is little time or space. He was a poet, for he read a Phi Beta Kappa poem at Commencement on the theme "Professional Life," in words somewhat original, in style Drydenesque.

And while he was doing these intellectual things, his hands were not idle, nor was his tongue backward in telling of his tasks. Of his many-sidedness, perhaps I have said enough, and it will illustrate the "why" of his being appointed Rumford professor and lecturer on the application of science to the useful arts at Harvard.

He was the first Rumford professor.

Again, were it not for the limits of time, it would be pleasant to say something of that distinguished Count Rumford, and to tell Tyndall's delightful story of his romantic and useful life.

But Rumford was dead, and had left some money to Harvard College for the purpose aforesaid, and Bigelow was appointed to carry out the purpose — a man, I believe, after Rumford's own heart.

This novel bequest of Rumford, which established a professorship with an annual income of $1000, marks an interesting departure in American university education. It seems to have been accepted by the college with a certain amount of skepticism at first; but the unusual talents and ability of the first professor shed a light upon utilitarian topics which was unsuspected by the dons of that day.

On the 11th of December, 1816, Bigelow devoted his opening lecture to the life and works of Count Rumford. The force, sanity, and eloquence of the address,

when it came to be printed, met with praise from men of all sorts.

I think that this appointment, and the meaning of it all, came to be for Bigelow the most significant event of his life. Doubtless, the developing science of the last century would have found in him an enthusiastic student under any circumstances. But it is fair to suppose, and pleasant to believe, that Rumford, the distinguished American, the idol of foreign courts, the founder of scientific bodies, stimulated and left behind him in his native State a young disciple, who needed only that brilliant and successful example to lead him wisely toward the pursuit of truth.

Of these first lectures of Bigelow, the youthful professor, I can give but slight account. The showing of apparatus and the description of technics lend themselves feebly to the printed page. But we know that the lectures were successful, and stimulated a growing demand for the popular demonstration of the elements of science.

To Bigelow himself their value was greatest, doubtless, as I have said. He was the first of a line of distinguished men to hold this chair, and is represented in it to-day by Wolcott Gibbs, professor emeritus, and John Trowbridge, the actual incumbent.

Then there was that other pursuit, botany, which, with medicine and technology, occupied his life. The little book on Boston flora, published in 1814, was popular at once. The subject was so plainly and charmingly handled that the volume had a large circulation among the laity from its first publication.

Ten years later, in 1824, a second and very much enlarged edition appeared.

This was the beginning only of his botanical givings forth. The work for which he was early distinguished, which brought him into closest contact with the savants of Europe, and gave him honor in his own country, was the elaborate series of volumes published under the title, "American Medical Botany."

This treatise purports to cover the ground indicated by its title, in a popular as well as exhaustive manner, and a special interest in it is the elaborate system of plates, designed and largely executed by Bigelow himself.

These rare volumes impress one strongly with the style and method of their contents; the distinctness, finish, and beauty of their illustrations; and the excellence of their appearance in paper and typography, which would make them creditable productions at the present day. Their popularity with the unprofessional reader was enhanced by their author's avoidance of technical terms. Copies are now extremely rare.

Bigelow's eminence as a botanist was recognized also by his being appointed an editor of the first edition of the "United States Pharmacopœia," in 1820, at the age of thirty-three, in association with Spaulding of New York, Hewson of Philadelphia, Ives of New Haven, and De Butts of Baltimore. In this publication Bigelow's scheme of simplifying nomenclature was followed, thus distinguishing the "American Pharmacopœia" from that of Great Britain.

In 1817, when thirty years old, Bigelow married Mary Scollay, a daughter of Colonel William Scollay

of Boston. They had five children, one of whom was Henry Jacob, famous among American surgeons.

So in the year 1820 we may regard Jacob Bigelow as well launched in his life work. Though still young, a recognized authority on botany, a distinguished lecturer on applied science, a successful teacher and practitioner of medicine; already approaching the acme of his life work as a physician, let us believe, though the exact extent of his activities is not entirely apparent.

To one studying the professional conditions in Boston at that day, the burden of incessant practice would appear to have been less onerous than it has since become. Boston was fortunate in a goodly number of eminent doctors, and though fees were small, as we reckon fees, it would appear that all were comfortably supported in that frugal generation. Indeed, as regards many of those well-known men, one is not impressed with the sense of their incessant and overburdened professional activities, great incomes, and the increasing demand for their services, as was the case with their English contemporaries. They seem to have had time for a diversity of interests, and it is for this reason, perhaps, that they have left behind them the reputation for wide philanthropy, good literary and scientific attainments, and respectable scholarship.

In the present day Boston physicians are not conspicuously public spirited. Tradition says that in this they have degenerated. However that may be and whatever the cause, in Jacob Bigelow we have a notable example of the reverse. Through life he was eager and forward in many public movements; in

some of them an originator and leader. As with most men, the story of his life falls naturally into three chapters — development, maturity, and age. In all except the last he was precocious. For this reason his activities covered a multitude of years. We have traced him through the first chapter. Let the second chapter begin at the age of thirty-eight, and be ushered in with the inception of his first conspicuous public service — the founding of Mount Auburn Cemetery.

Up to this time, 1825, the dead of our cities had been buried in the city churchyards and vaults, and the problem of their disposal was becoming an urgent and distressing one. With the increase of population the ground was becoming encroached upon, at the same time that the burials were becoming more frequent. Many of the older churchyards had long been full. Interments were made in graves already occupied, and ancient bones were being disinterred and removed. Shocking as all this was to the sensibility of the community, the danger to the public health was becoming still more serious.

All this had long been a matter of grave concern to Bigelow, and in this year, 1825, he called together at his house a small company of prominent men to discuss the situation and its remedy. He proposed to them a plan which met with their cordial approval, though when it was made public it was received with a storm of opposition and ridicule.

Bigelow's proposition was the founding of an extra-urban forest cemetery. In a delightful and convincing series of papers he pointed out the reasonableness of

this plan and the offense of the existing methods. The arguments he used are familiar enough to us today. Little was needed to show the disadvantage of past conditions and the advantage of returning bodies to a virgin soil where rapid decomposition in a forest garden might go on unchecked. This was told graphically and strikingly.

For seven years the debate went on, until, in 1832, in spite of constant and powerful dissent, the cemetery at Mount Auburn was dedicated for public use. The place is situated in a piece of woods about a mile from Harvard College, on the banks of the Charles, and had long been a favorite resort for lovers of nature. The students had named it "Sweet Auburn."

In every sense Bigelow was the founder and promoter of this first modern cemetery. He laid out the grounds; he thinned the trees; he surveyed roads, paths, and hedges; he supervised its ornamentation; he designed its classic gateway and approach. For it, indeed, he became the first of our landscape architects.

The success of the new plan was instantaneous and pronounced. From the very opening of the cemetery it appealed to the sentiments as well as to the reason of our people; and numberless imitations were promptly projected in all parts of the country. As long as he lived, Bigelow continued an active supporter and director of this work.

In 1872, forty years later, he planned and presented to the trustees the famous Mount Auburn Sphinx — a memorial to the Union soldiers of our Civil War. It bears this inscription: —

"America conservata
Africa liberata
Populo magno assurgente
Heroum sanguine fuso."

The year 1832 was marked by the outbreak of a great cholera epidemic in this country. The disease raged fearfully in many of the seaboard towns. In New York alone three thousand died — the city was almost deserted by the terrified inhabitants. Those must have been stirring days, if we can believe the colorless recital even of Bigelow's biographer.

Early in the epidemic, and before it had reached Boston, the authorities there determined on vigorous measures for the protection of the city. A strict quarantine was enforced, and a number of eminent physicians were invited to investigate the New York conditions. It is stated that some of those who were asked to take part in this work found reasons for declining; but Bigelow, Ware, and Flint offered their services, and went as commissioners to the stricken city.

The conditions they found there were said to beggar description. Brockden Brown, in his pompous but luminous pages, tells the story of an earlier visitation; and the same was true in this year of 1832 — terror everywhere — deserted streets, crowded hospitals, frightened attendants, and devoted physicians. It was, indeed, such a plague as was known to the Italy of the Middle Ages. The Boston physicians saw and reported. They visited the hospitals; they conferred with the authorities; they studied the cases; and they found a state of affairs far worse than rumor had pictured.

Their mission ended, they returned home, through some difficulties, we are told; for local authorities refused them passport. They were actually turned away from the city of Providence, and forced by a circuitous route to make their journey to Boston.

So grievous is their report said to have been that the mayor of Boston withheld it from publication for fear of alarming the community; but their recommendations were of the greatest value; and through their efforts the disease was mostly averted from the town; the mortality figures showing that while New York lost three thousand by death, and many other seaboard cities between one and two thousand, the Boston deaths were but one hundred in all.

It seems as though, with the approach of middle age, Bigelow had already accomplished a good life work. Indeed, he himself appears so to have thought. In 1833 he was forty-six years old, and felt himself to have earned a rest from his constant labors. In this year, then, he went to Europe for the first time — a mature man, famous in his own country, and already well known to foreign scholars. One of his companions in this voyage was the young O. W. Holmes, his pupil, a recent graduate in medicine, going to Paris to complete his education.

With this voyage ends the story told in Bigelow's modest autobiography.

Beginning with this second era, his middle age, Bigelow's activities continued in many new directions. He was visiting physician to the Massachusetts General Hospital. He was professor of Materia Medica at

Harvard. He conducted an enormous consulting practice. He was a frequent contributor to the press on matters of public interest. He was chairman or trustee of many important public and private organizations. But above all, he became conspicuous for the great reforms which he instituted in the practice of medicine.

Mount Auburn will always remain a permanent monument to Bigelow, the citizen. But the physician's work as a pioneer in science should, and I believe will, give him a more permanent place in our annals.

At the outset of his professional life he was imbued with the prejudices and traditions of the so-called heroic method. He had been taught that the department of therapeutics was the most important in medical practice. This was the belief of all the world at that time, and with few exceptions physicians regarded the study of disease, the careful review of etiology, the course and nature of symptoms, the appearance of morbid processes, and the proper estimate of prognosis as very secondary matters.

To be sure, there were rising in France and in England a few men who were beginning to appreciate the value of observation; and the statistical method, rather than the study of individual cases, about this time had its inception. But such work, and especially that of Louis in Paris, as yet was little known.

In our own country medicine had scarcely advanced beyond the teaching of the eighteenth century, and, with the exception of Jenner's vaccine, we were still in darkness.

Very early in his career, and influenced by his in-

terest in and pursuit of science in broader fields, Bigelow was led to a habit of observation and just conclusion. He came to see that disease is by no means susceptible of ready curtailment; that great numbers of processes run a definite course, with spontaneous recovery; that other processes subside and recur periodically; that others still persist to the end uninfluenced by therapeutic measures; and that there is underlying it all a *vis medicatrix naturæ*, too little reckoned with.

In those early days, too, when ingenious men were advancing theories founded on speculation and insufficient observation, when text-books were loaded with *ex cathedra dicta*, dogmatic teachers were looked up to by the public and by medical students as almost divine healers. Meantime the teaching of Hahnemann, and the wide enthusiasm of his followers in homœopathy, had led great numbers of persons to regard the ancient methods as humbug; and many educated men were being led away into these new practices. Bigelow saw clearly and pointed out the significance and meaning of it all. His voice was heard in the land, and for many years, in season and out of season, he ceased not his demonstrations of the self-limited character of disease.

All of this is now so trite and so familiar even to the intelligent among the laity that it seems a little thing. But the daring of it and the success of the pioneer in those days were heroic and real.

In 1835, in an address on "Self-limited Diseases," before the Massachusetts Medical Society, Bigelow struck the true note; the effect was instantaneous and immense.

In popular opinion homœopathy has the credit of inciting and furthering that radical change in the methods of medical practice which has now prevailed among us for two generations. Quite otherwise is the truth. Writing in 1880, O. W. Holmes says in reference to this address of Bigelow: "This remarkable essay has probably had more influence on medical practice in America than any similar brief treatise, we might say than any work ever published in this country. Its suggestions were scattered abroad at the exact fertilizing moment when public opinion was matured enough for their reception."

In 1852 Bigelow delivered before the students of the Massachusetts Medical College [Harvard] in Boston, a striking address on medical education, the keynote of which was similar to that of his famous essay on "Self-limited Diseases"; at the same time he urged upon his students the great importance of a thorough scientific training. This was twenty years before that beginning of reform in medical education in America which was initiated by Harvard some thirty years ago. The trend of Bigelow's remarks was in the line of those better things with which we are now familiar.

He naturally deprecated the vicious practice of that day which allowed students to qualify for the degree after two short courses of lectures and a certain amount of practice in the offices of physicians. But he went much farther than merely urging that three and four years' course of medical study which we now know; he anticipated and advocated that development of special instruction to which to-day we are turning.

Didactic lectures in themselves he recognized as useful and important; but original research on the part of students, and personal investigations in laboratories, in small classes, under the supervision of competent instructors, he advocated as most important of all. His views on this subject coincide with those of the leading scientists of modern times, and it has interested me lately, in reading Huxley's biography, to see how forty years ago that great man insisted upon the personal, as distinguished from the second-hand, methods of study.

Bigelow then went on in his characteristic style to define the exact sciences and the speculative sciences; preëminent among the latter he places practical medicine — "a science older than civilization, cultivated and honored in all ages, powerful for good or for evil, progressive in its character, but still unsettled in its principles, remunerative in fame and fortune to its successful cultivators, and rich in the fruits of a good conscience to its honest votaries. Encumbered as it is with difficulty, fallacy, and doubt, medicine yet constitutes one of the learned professions. It is largely represented in every city, village, and hamlet. Its imperfections are lost sight of in the overwhelming importance of its objects. The living look to it for succor; the dying call on it for rescue."

He proceeded more elaborately to explain the difficulties of therapeutics, using the old-time comparison between the physician and the experienced pilot, and showing that the rocks and narrows in the pilot's course must be known to him, this knowledge being of

far more importance for the safety of his bark than his ability to calm the winds and the waves.

And so he comes to the inevitable conclusion — for us now the last word — "that he is a great physician who above other men understands diagnosis."

This charming essay, intended for young beginners, lucid, free from technicalities, can be read by any layman, and is indeed a very missionary tract.

Those two essays, and a number of others on medical and general topics, — homœopathy, quackery, burial of the dead, pneumo-thorax, tea and coffee, the history and use of tobacco, etc., — are bound together in a little volume, entitled "Nature in Disease, and Other Writings," published in 1854.

In the last generation this book was to be found on the shelves of every well-equipped library in New England. Simple and unpretentious, its influence inside and outside the profession was immense, and I believe to it, more than to the writings of any other one man, we owe the appreciation and popularity of the medical profession in this country.

In such studies and pursuits, then, we must believe that Bigelow immersed himself for the many years of his long middle age.

Of his private life there is no space to tell, nor of his connection with the stirring events preceding and accompanying the Civil War.

Side glimpses of him we have in the records of medical societies of those days; notice of his constant attendance at such meetings; and quotations from his strong, wise, and earnest sayings. In those years his

son, Henry J. Bigelow, was coming rapidly to the front as teacher and practitioner of surgery; and when we come down to the Civil War days, both of these men, father and son, were already past military age, so that their public labors in those trying times were little associated with the activities of camp and battle.

The high patriotism of the elder man, we know; for is it not evidenced by that monument which he himself designed?

* * * * * * *

With the war days began the third era in Bigelow's life — his old age. Still useful, still forceful, his endeavor was constant for the intellectual uplift of his fellows.

Throughout his long career, his utilitarian studies, his contact with eminent scientific men of all countries, and his abundant experience as a practitioner of medicine had confirmed him in the belief that the old-time pursuit of the classics, the traditional "liberal education," was for success and usefulness in life by no means salient. Indeed, he had convinced himself that in our days a liberal education means far more than an intimacy with the ancient classics; and this, too, in spite of his own high training and accomplishments in that branch of learning.

With such convictions Bigelow took a profound interest in the Massachusetts Institute of Technology, which was incorporated in the early days of the Civil War; and at the dedication of its new hall, on the 16th November, 1865, he delivered a striking address on the "Limits of Education." His object was to break,

or rather to extend, those limits in a way to make education "conduce most to the progress, the efficiency, the virtue, and the welfare of men."

This address is so striking, so in advance of the times, so complete, even for us to-day; so little has been added to it by more recent thinkers, that it is difficult to pass it by without quotation.

The early training of a pupil must be as thorough as possible; "but after this is completed, a special or departmental course of studies should be selected — such as appears most likely to conduct him to his appropriate sphere of usefulness. Collateral studies of different kinds may always be allowed; but they should be subordinate and subsidiary and need not interfere with the great objects of his special education."

"A common college education now culminates in the student becoming what is called a master of arts; but this, in the majority of cases, means simply a master of nothing."

He assigns much of the modern conditions among us to English conservatism, for the conservation of a privileged order — "It is the duty of educational institutions to adapt themselves to the wants of the place and time in which they exist."

"Life is no less short now than it was for the Roman poet, but art is vastly longer."

Such earnest thoughts as these were much in Bigelow's mind, and he carried them soon to the American Academy of Arts and Sciences, over which he had long presided.

In his address before the Academy the next year he developed the same theme; realizing the immense demand of this expanding country for the services of expert, educated men — "in its cities and mining regions and factories and workshops; for skilled labor, for chemists, engineers, architects, constructors, overseers."

A great antagonism was aroused, but the majority of critics were friendly.

Out of this turmoil, and especially out of a challenge on the arena of the academy, came a further reply from Bigelow. His biographer describes the scene from memory — a social meeting of the Academy at Bigelow's house, on the evening of the 20th of November, 1866. The title: "On Classical and Utilitarian Studies."

This paper was the longest, the most elaborate, and the most learned of his written productions on education. Of it, his biographer says: "The sparkle and brilliancy of its style, the exuberance of its playful humor, the keenness of its occasional satire, the compass and wealth of its scholarship, the cogency of its accumulating argument and demonstrative affirmations may claim for that essay a very high distinction among the masses of our recent like productions."

The pith of his argument is this, and it is the argument underlying the whole trend of modern democratic thought: That education is the right of the many and not the privilege of the few; that that conservatism which restricts education to the classics and what may be called æsthetic culture is but the highest form of

class selfishness; that such practices are not only in themselves vicious, but tend to the lowering of the whole educational fabric; that the underlying thought in education is the teaching how to *think* and the meaning of *study;* and this much at least is due to the masses; that it is those things which tend most to the useful arts, to the alleviation of human suffering, to the broadening of the popular horizon, for which we must all strive. All this, trite enough to us in these days, was not an old thought thirty-five years ago, even to the distinguished scholars who formed his audience; and the teachings of Froebel had not yet been accepted among us here.

Then, glancing rapidly back, Bigelow said: "The wisdom of the ancients was selfish in its privileges, inwrought with error, superstition, and vice; confined to a very few; inoperative and useless to the masses, it did not and could not advance any vast public and improving interests, nor conserve social prosperity and order."

Speaking of the Renaissance, he remarks, in a paragraph full of interest, that the popular idea of this brilliant epoch as a revival of classical learning is untrue. The study of the classics was but one evidence of the reviving and widespread interest in intellectual pursuits. Literature, the arts, science, all shared equally in the new advance; and of them all, science soon began to cut for itself a broad, new, and straight path.

How large an influence these discourses of Bigelow had upon modern thought and purpose it is difficult

to say. Doubtless, he was one of many; but the interesting thing is this: that such teaching, vigorous, forceful, forward, was but the continuation of the lessons of a long life; for eighty years he had been a modern. Grasping the meaning of science in his youth, he had held it steadily before him. And now we see him nearing the end of his career, preaching and teaching among the most radical thinkers; ancient as he was, leading the advance in the great educational reform of our time. Never senile, never looking backward, but always confident of better things to come.

These educational essays caused widespread discussion, both at home and abroad, when they came to be distributed. The historian, Lecky, wrote from Italy a strong and interesting letter of dissent; but Lyell, Huxley, Spencer, and other liberal Englishmen were vigorous in their commendations. The essays under the title "Modern Inquiries" were published at the time of a forward educational movement in England.

Lyell wrote to Bigelow: "Our universities and all the principal schools are, as you know, in the hands of the clergy; hence we shall have more difficulty than you in introducing the elements of science and natural history. The clergy — Romanist, Anglican, and Dissenting — have hitherto proved too strong for us. Reformers and American and continental rivalry must be brought to bear before we shall succeed. Your book will be most useful at this moment in this country."

"By their fruits ye shall know them" is sometimes true. It is true at least in Bigelow's case; for I believe it is fair to say that the Massachusetts Institute of

Technology, with its splendid curriculum, its strong staff, its host of highly trained and successful graduates, stands to-day a monument, in part at least, to the energies of this distinguished man.

That work for educational reform was Jacob Bigelow's last great work. He did many other things in his declining years; pleasant things, to be remembered by his friends. He became the old-man Oracle — a Nestor most distinguished, most approachable; of whom one hears to-day nothing but good. It was a busy old age, given for a time, more than is the wont with Nestors, to travel and intercourse with men. When eighty-three, he went to California, a pleasure trip with wife and friends; and of the wonders there he explored many.

In old age, too, he amused himself much with playful writings, extra-professional, the best known of which was ΧΗΝΩΔΙΑ, "Chenodia" — a classical Mother Goose, the ditties of that good dame rendered into Greek and Latin.

A pretty collection is Αἰόλος Ποίησις (Various Poetry), a volume of fugitive, humorous poems, attached to which are the names of well-known writers, his friends: Bryant, Longfellow, Holmes, Emerson, Lowell, and others.

In such and other pleasantries he passed his declining days — not in harness, a garb scarce suited to ninety-two. Blind at the last, for nearly five years. Bedridden, but with mind undimmed. Much sought out, even so. Unforgotten to the very end, though long inactive among us. The *story* fades away gently — the *history* remains.

BOSTON MEDICINE ONE HUNDRED YEARS AGO AND A NOTABLE PHYSICIAN OF THE LAST CENTURY[1]

In 1807 but four young men were graduated in medicine from the Harvard school, and received the degree of M.B. Those were pleasant times in which to live in Boston. The town was still a small town, not yet raised to the dignity of a city — a town of 25,000 inhabitants, about a quarter the size of our modern Cambridge, or with a population one twentieth of what Baltimore now contains. We have abundance of light on the life of the period. Men of letters were concerned in writing history, and the journals and epistles of the day abound in descriptive story. The Harvard Medical School was 25 years old, and the original three professors, John Warren, Benjamin Waterhouse, and Aaron Dexter still exercised their professorial functions. It was a time of comfort and activity in the commercial and academic worlds. Society was busy in charity, and spoke good will; while the temper of the people was not different from what it had been more than a hundred years earlier when Increase Mather wrote of Boston that "for charity, he might indeed speak it without flattery, this town hath not many equals on the face of the earth." Some fond optimists still maintain the boast.

[1] Read before the Johns Hopkins Hospital Historical Club, February 11, 1907.

In those days of 100 years ago, the respectable and influential people of the town — as the old writers call them — were actively exercised in forming and carrying on all sorts of educational, philanthropic, and literary enterprises, as their descendants do to this day. The Massachusetts Medical Society, the most potent and far-reaching of state medical societies, was making itself felt in the uplift of the profession, and among its active and important promoters were such well-known men as Holyoke, the two Warrens, Jackson, Gorham, and Jacob Bigelow; the Medical School was developing as an important department of Harvard University; the Massachusetts Historical Society was in the 14th year of its distinguished career; libraries such as the Columbian, the Anthology Reading Room — which subsequently became the Boston Atheneum — and the Boston Library Society were beginning to gather those great collections which to-day are the pride and solace of scholars; the Massachusetts Humane Society, the Massachusetts Charitable Association, the Charitable Mechanic Association, the Boston Dispensary, the Boston Female Asylum, and a dozen other cognate organizations were flourishing in a vigorous young life. The Massachusetts General Hospital was in process of inception at this time, though 14 years were to elapse before it was opened to patients.

Writers tell of a charming society living in the midst of an unusually beautiful environment. The country of eastern Massachusetts was nearly 200 years settled, and in those days, before railroads and steamboats existed, when connection with other states was by

post road and coasting vessels, Boston seemed a remote and detached town. It was then an important shipping port. The vessels of its merchants sailed for the old countries of Europe, the south seas, and India, so that it had built up within itself a rather self-centered population; a community old in years as American communities then went, with long-established customs, and a widely cultivated country, after the turmoil of the Revolution. Be it remembered of Boston society, as with the society of other ancient colonial towns, that the Revolution had put an end almost to the old time dignified life. Representative families, largely, were Toriés, and left the country when Boston fell before the arms of Washington. A new society grew up and new men appeared as eminent citizens, so that it was not until a second generation began to develop, that a renewing of the former stability became apparent. That was the condition in the early years of the last century. The Revolution and the infusion of new, restless, democratic persons into the affairs of the place, tinctured though such persons were with many of the ideas and prejudices of former times, developed an active, progressive, and interesting assemblage of people. In 1807 the growth of the new West had hardly begun to take on that fury of interest and activity which characterized it in the next generation. The old states themselves were thinly settled still, and eastern Massachusetts, isolated and far removed from other great centers, went about its business in self-confident and thorough fashion.

There was one exception as yet to this self-confidence,

and that exception was in the education of physicians. Massachusetts had always abounded in doctors. The medical profession was a favorite profession there in colonial days, but the best of the doctors had to look beyond the colony for their education. Many of them went to London and Edinburgh, but more flocked to the Philadelphia school. The foundation of the Harvard Medical School, in 1782, by no means put a stop to those Philadelphia journeys, for it took many years to bring the Harvard school up to the Philadelphia standard. Many young men contented themselves still with completing their professional studies in the offices of some licensed practitioner; a few took a two-term course at the Harvard school, but the more ambitious traveled away to Europe and to Philadelphia to complete their studies and receive the doctor's degree. In those days Philadelphia had this lead over Boston in the advantages it offered medical students, that it provided abundant clinics at the old Pennsylvania Hospital. At Harvard there was no clinic worth the name. A few patients were shown weekly at the ancient Boston almshouse, but the school proper was in Cambridge, a two hours' journey from Boston then, and the instruction given in Cambridge was altogether didactic. I am not sure but what the total instruction of those times was extremely good instruction. In a measure we have returned in these days to a similitude of the ancient method. Largely the instruction was personal. A group of two or three young men studied under and received the active directions of an experienced physician, and supple-

mented the knowledge of practice thus acquired by the didactic lectures of Warren and Waterhouse in Cambridge.

A younger generation as it came along, however, was dissatisfied with the old method. The young men were convinced that a medical school two hours from the metropolis could not flourish; and well-equipped physicians returning from London and Philadelphia urged the importance of reëstablishing properly the somewhat somnolent Harvard school. We must remember, however, that the views of a community of 100 years ago differed materially from modern views. The laity feared great bands of medical students, regarding them as vandals; while practicing physicians had a natural feeling of jealousy of a medical school, fearing that it would detract from their own importance as educators, and would raise to an unduly prominent position in the profession the teachers in the school. If the development of Boston medicine had depended upon a majority vote, uninstructed by the enlightened few, there can be no doubt that the Harvard school would have languished obscurely in Cambridge for another generation, or would have disappeared; but fortunately some in the community were coming to take broader views, through the stimulus of such general educational enterprises as I have already mentioned, and through the urging of young enthusiasts fresh from the hospitals of Europe. Of the latter class, John Collins Warren and James Jackson, six years established in practice, were the most active; and Warren's father, John Warren, the honored pro-

fessor of surgery, lent himself earnestly to the forward movement. Curiously enough his colleague, Benjamin Waterhouse, professor of practice, himself a product of European schools, opposed bitterly, and to the end of his career as a teacher, the plan for medical school expansion. He was a didactic teacher, little given to the arts of clinical instruction, and he seems to have feared the comparison and rivalry of an association with the proposed new professor of clinical medicine, young James Jackson. But liberal views came eventually to prevail through much travail and grievous heartburning. Waterhouse left nothing undone which might obstruct progress. He joined with others in an endeavor to anticipate the Harvard movement, by establishing in Boston a rival school of medicine to be known as the College of Physicians; and when that endeavor failed he attempted to damage his colleagues by publishing what the corporation of the college designated as false, scandalous, and malicious libels upon the other professors, which had a tendency to injure their characters, offend their feelings, and diminish their usefulness in the university. The outcome of it all was that Waterhouse was forced to resign after the school had been removed to Boston, which was accomplished in 1810. Then the faculty was reënforced and reorganized, with such strong and notable representatives as I have already named.

So out of much turmoil, eager initiative, and vigorous agitation on the part of a rising generation there was launched that small but effective school of medicine whose leaders, after struggling for academic reform in

their youth, founded a great hospital in their prime, and in their old age revolutionized surgery by the discovery and introduction of ether anæsthesia.

You will perceive that it was an active, well-trained, onward pressing generation, given much to that spirit of progress which prevailed throughout the land; but instructed also in ancient culture, in old-time kindliness, and with an enthusiasm, born of noble, national tradition and the philosophy of the day, for self-help, neighborly benefit, and wide-reaching, catholic philanthropy.

We have heard much in recent years of the leaders who struggled in those days; let us turn the page and make ourselves acquainted with a joyous youth who grew up under such teachers, and put their teaching to the proof, Samuel Gridley Howe.

To the average American of to-day Samuel Howe is known, if at all, as the half-forgotten husband only of that distinguished veteran poetess, Julia Ward Howe. Truly the pen is mightier than the sword. But he was himself the author of many good things for which American physicians, at least, should cherish him. It was a brilliant, impetuous, heroic nature; with a romantic career — full of lights and shadows, and strange contrasts. Pedantic folk used to call him "the apostle of freedom."

Howe was born in Boston in 1801, nine years before the Harvard school was removed from Cambridge. That was the year which saw the establishment in practice of Jackson and John C. Warren, and the new vaccination of Jenner introduced to these shores.

There was little wealth in Howe's family, and the little there was dwindled sadly during the war of 1812; for his father, Joseph N. Howe, a shipowner and maker of cordage, trusted the federal government for naval supplies, and the government failed him. The unhappy merchant was brought nearly to ruin, and his family grew up in poverty. In spite of this there was money supplied for sending one of the boys to college, and Samuel was selected. He went to Brown, whence he was graduated in 1821, at the age of 20, a mature age for graduation in those days. The young man was an optimist born, an enthusiast, and a lover of his kind. In his growing years he had seen develop in Boston those useful and pleasant enterprises of which I have told. In spite of commercial embargo and the English war, the buoyant spirit of the people continued to expand. With the fall of Napoleon and the general political reaction which set in throughout Europe, and in the face of the Holy Alliance with its far-reaching purposes, American patriots felt that the liberties of the race had been intrusted to them by special providence. The Monroe Doctrine threw out a barrier against despotic aggression on these continents; and the youth of the land were growing up with a vivid enthusiasm for liberty, and with generous good will for the oppressed.

I have dwelt at some length on these qualities of our people in those times, because such were the qualities and sentiments which went far towards directing the impulses of young Howe, and molding his career.

In the year of his graduating from college the insurrection in Greece against Turkish rule broke out, and thrilled the world. Probably no similar uprising ever awoke wider sympathy or provoked a more unanimous applause. Despotic governments trembled and frowned, but peoples rejoiced. Now, Howe was one of the people. While the senates of the old world were avoiding the ugly question of interference in Greece, and premiers were giving their secret instructions; while popular representatives at Washington were waving the flag and fulminating against tyrants, young Howe was pondering all these things. We know how the united uprising of the Greeks, though feebly directed and cruelly mismanaged, was able in three years to sweep away the contemptible opposition of intrenched Turkish misrule, and how the Porte was forced to turn to Egypt for aid against his revolted subjects. During those three years Howe was content to remain a spectator of the struggle, busied meantime with perfecting his education.

After his graduation from Brown he returned to Boston and entered as a medical student the office of Jacob Bigelow. At the same time he attended the lectures in the Harvard school, and the clinics at the Massachusetts General Hospital, finding as instructors Jackson, J. C. Warren, Parkman, and Ingalls. He must have been an interesting student — dear to the soul of such a splendid independent as Bigelow — acceptable even to the hard-headed, brilliant Warren, and his wise, great-hearted colleague Jackson. Such men could appreciate a promising student, and were

foretelling an unusual future for Howe, when suddenly he astounded them and the Boston community by announcing that he was going to Greece. Even the restrained writers of the day flutter with protest and amazement when they tell of it. No one encouraged the rashness. The young man was called Byron-mad. No one encouraged him except one eminent man, — Gilbert Stuart, the artist, now growing old, who faltered that his heart also was in the venture if only the times were still young for him. He helped Howe to go. He gave him money, got for him a letter from Edward Everett to an old friend in Greece, and with a quavering blessing sent him on his way.

So far it was all very fine, but our adventurer soon found his work cut out for him. When he left Boston, Greece was flushed with success, and preparing confidently for the final struggle. When he reached Napoli de Monembasia and had pushed on to the Greek headquarters, he found himself in a mob of terrified officials, without concert, screaming diverse counsels, savage, fatuous, ungoverned. Three years of horror had demoralized the Greeks, the best of whose leaders had been lost; though the people themselves had become hardy and trained to a cruel guerrilla warfare. In the autumn of 1824, when Howe joined these people, they were waiting for the coming against them of a great Egyptian armament commanded by Ibrahim Pasha, one of the most vicious and clever reprobates in history; admiral of a considerable fleet, and captain of as bloodthirsty a set of cutthroats as ever twisted a neck. Four years later Howe published

a short account of the proceedings of these gentry. Here are his own modest words: —

"In the winter the much-dreaded expedition of Ibrahim Pasha, with the Egyptian army, landed at Molai. Attempts were made by the Greek government to get up an army to oppose them, and Mavrocordato accepted my offer to go with them as surgeon. The president and Mavrocordato came to the south of the Peloponnesus with such forces as they could raise. At first there was an attempt to organize the army, and I attempted to create hospitals and to organize ambulances for the wounded. But after the capture of Navarino by the Turks, everything was thrown into confusion. Mavrocordato fled to Napoli. The dark day of Greece had come. All regular opposition of the Greeks was overcome. The Turks advanced fiercely and rapidly up the Peloponnesus. I joined one of the small guerrilla bands that hung about the enemy, doing all the harm they could. I could be of little or no use as surgeon, and was expected to divide my attention between killing Turks, helping Greeks, and taking care of myself. I was naturally very hardy, active and tough, and soon became equal to any of the mountain soldiery in capacity for endurance of fatigue, hunger, and watchfulness. I could carry my gun and heavy belt with yatagan and pistols all day long, clambering among the mountain passes, could eat sorrel and snails, or go without anything, and at night lie down on the ground with only my shaggy capot, and sleep like a dog."

Long afterward our gentle poet Whittier took Howe for his subject in "The Hero" and described an event which the hero himself recounts: —

"I was by chance at Calamata after escaping from Navarino, when a sudden invasion of the Turks forced every one to fly who could fly. I never shall forget the dreadful scene of confusion and distress, or my feelings, as I galloped through the town, accompanied by Ernest, a gallant young Swiss, for we passed many poor beings, old or sick, who were unable to fly on foot, and who stretched out their hands praying for God's sake that we would save them; but selfishness and the pressing danger made us turn a deaf ear, and think only of saving our own lives. We had left the town and were hurrying across the plain, which was occupied with fugitives, when I beheld a wounded soldier sitting at the foot of an olive tree, pale, exhausted, and almost fainting, but still grasping his long gun as if he meant to have a last shot at the expected foe; it was Francesco, who had been dreadfully wounded a few days before, and had staggered thus far from the temporary hospital at Calamata, on hearing the alarm. The poor fellow cast a supplicating look at us as we passed, but said not a word. That look cut me to the soul; had he presented his gun and demanded my horse, it would not have so moved me; I could not but turn my head after we passed him, and seeing him still looking after us, as I thought reproachfully, I pulled up my horse, and on calculating the distance, found I had time to gain the mountain; of course I turned back, mounted the poor fellow on my beast,

and thus easily reaped the rich reward of his gratitude."

The narrative runs on for many pages. We know how the Egyptians overran the land, and how at last the fleets of England, Russia, and France were sent to intervene. By that time Howe had been three years in the Greek service, and was acting as surgeon-in-chief of the Greek fleet, a formidable collection of three frigates, two sloops, and half a dozen wherries. On October 20, 1827, the strong armada of the European allies bottled up the Turco-Egyptian fleet in the harbor of Navarino, and annihilated it in an action as blood-curdling as the heart of Ibrahim himself could have asked. We are not told what part the Greek fleet, with their surgeon from Suffolk county, took in this action, but it is probable they were content to be spectators.

The slaughter of the Egyptians ended Turkish rule in Greece. Peace was established after much tribulation, and in the course of time a limited monarchy was set up with a Bavarian prince on the throne, as the figurehead of the Western powers. Immediately after the battle of Navarino, however, Howe saw that the country was falling into a state of poverty and starvation. He was a humanitarian first, a physician and a soldier afterwards, so he resigned his office of surgeon-general, and posted back to Boston to proclaim the good tidings, and raise money for his suffering Greeks. The estimable ladies of Massachusetts listened over their teacups to the strange tales of the young Ulysses: they were moved to hold a fancy fair in Faneuil Hall; their husbands drew out their pocket-

books, and Howe was dispatched back to Greece with a shipful of food and clothes. Then there was more trouble. The unhappy descendants of Plato and Pausanias had fallen to fighting among themselves, and sundry brigands with high-sounding titles attempted to relieve the missionary of his stores. Fortunately our old frigate Constitution happened to come along, and a file of marines from the vessel settled the dispute among the discordant Greek patriots. Howe distributed his good things, said good-by to his mendicant comrades, and returned peacefully to his own country. The pathos and the humor of it all sift down to us through the century, and one fancies the picture: the ragged jabber of the poor, patched, huddled wretches, crouching among the ruins of departed Greece; each with a loaf of Yankee bread in one hand, a rusty dirk at the waist, smearing his face with farewell tears, and shouting to our departing hero as he steps smartly upon the deck of the neat cruiser, waves his hat and sails away for the smiling land across the polished sea.

In 1828, with Howe's return from Greece, the adventurous chapter of his life seemed to close; but other chapters and other adventures awaited him. He was an eager, inquiring soul; looking ever for something new, always appearing to tilt at windmills; but out of each bout bringing a measure of practical success, and hastening to new encounters. He was not content to tread in beaten paths, or gather laurels in familiar fields. While his contemporaries were earning snug incomes in the old lines of practice, Howe

was laying his own new lines, and attacking problems of disease hitherto held incurable. His works do live.

First he turned to the education of those born blind. A hundred years ago there was no future before these unhappy folk, save poverty, ignorance, and dependence, or suicide — and suicide even is not readily to be attained by one who cannot see. Howe was fortunate enough to secure the sympathy and support of Dr. John D. Fisher, a young man, one year his own junior — himself a philanthropist and with a private fortune. With Fisher's aid Howe took up the problem of teaching the blind and began his studies by visiting Europe again to investigate the Valentine Haüy methods then employed in Germany and France. In Europe he fell upon more adventures. France was in the throes of her second Revolution, and Howe reached Paris in time to see Louis Philippe seated insecurely upon the throne. Then Lafayette found him out and persuaded him to go on a mission to persecuted Poland in her death struggle with Russia; and to carry to the Poles supplies sent to them from their friends in America. So he became a filibuster in a small way. But the experience was a short one. The Poles were at the end of their tether. Howe visited them, accomplished his hazardous mission, and turned back to Berlin for the study of the blind. But the affair was not so simple, and he learned that free American citizens are not free to dabble casually in international politics. On the day of his arrival at the Prussian capital he was arrested by order of the government because of his Polish doings, was imprisoned, and was left to ruminate

for five weeks in a cell. But solitary confinement could not tame Samuel Howe. He secured some new German books on the education of the blind, and set about translating them. Years afterward the king of Prussia sent him a gold medal for his success in teaching Laura Bridgman, and the humorous philosopher tells how he calculated that the value of the medal offset exactly the charges for his fare while a guest in the German prison.

In 1832, when 31 years old, Howe settled down in Boston to that part of his life work for which he is most famous — the education of the blind. Happily Fisher stood by him; so did John Homans and Edward Brooks — names well known to-day in Massachusetts. Howe was full of ideas new to this country, and his active intelligence so supplemented the thoughts of others that he soon found himself a lonely pioneer in the work. Here is an interesting letter from a friend of Horace Mann to one of Howe's admirers.

"When we first became acquainted with Mr. Mann he took Mary [afterwards Mrs. Mann] and me to a small wooden house in Hollis Street where, in the simplest surroundings, we found Dr. Howe with the first half-dozen pupils he had first picked up in the highways and byways. He had then been about six months at work, and had invented and laboriously executed some books with raised letters, to teach them to read; some geographical maps, and the geometrical diagrams necessary for instruction in mathematics. He had gummed twine, I think, upon cardboard, an enormous labor, to form the letters of the alphabet.

"I shall not, in all time, forget the impression made upon me by seeing the hero of the Greek Revolution, who had narrowly missed being that of the Polish Revolution also; to see this hero, I say, wholly absorbed, and applying all the energies of his genius to this apparently humble work, and doing it as Christ did, without money and without price. His own resources at this time could not have paid the expenses of his undertaking, with all the economy and self-denial he practiced. The fuller purse of his friend and brother, Dr. Fisher, assisted him. Soon after our visit to him, he brought out his class for exhibition, in order to interest people and get money sufficient to carry on the work on a larger scale. The many exhibitions given created a furor of enthusiasm, and Colonel Perkins' great heart responded to the moving appeal. He now offered his fine estate in Pearl Street, a large house and grounds, for the use and benefit of the blind, provided that the city of Boston would raise $50,000 for the same purpose."

Howe was no dreamer. He was a man of affairs; a sane humanitarian; a tempered enthusiast. New working machinery was necessary; he created it, instructing his assistants so thoroughly that later, when the Sydenham school was established in England, a corps of Howe's former pupils were secured as teachers. He invented a novel form of raised letters for the books of the blind; and the first product of his press was a Bible which was published in 1843, — a book half the size, and produced at half the cost, of that Scriptures for the Blind then recently brought out in England.

As a schoolmaster of the blind, Howe was prolific of new and shrewd ideas for the discipline of the children. The old Adam enters into these youngsters as well as into their more fortunate fellows whose vision is unclouded. Howe used to maintain that punishments and rewards are mere conventions. Stand a boy on a stool, with a paper cap on his head, tell him that he is good and happy there and to be envied, and watch him preen himself like a young peacock. Give him a box of caramels, marked medicine, and see him groan and weep as he chokes them down. So Howe inspired his pupils with a sense of receiving merit-marks when they went to bed early, took cold baths, ate a wholesome diet, and exercised daily in the open air.

With this work for the blind securely launched, Howe found himself a mature man of many cares and experiences, approaching middle age. He was untiring. To test upon himself the continued sense of total darkness he blindfolded himself, and so went about for weeks. He learned to use the blind boys' types as skillfully as his best pupil; and with his eyes darkened he might be seen wandering about the streets in tow of a dog on a string. By such means he came to have an intimate appreciation of the atmosphere, the sensations, and the limitations of the blind, their capacities and their possible ambitions. Truly it was a case of the blind leading the blind; but ditches were friendly in those days, and walking was on the level.

Those were indeed times when light was beginning to shine in dark places. The great wave of modern altruism was rising. New ideas of expanding help-

fulness were awaking civilized minds. In France and Germany even honest men were seeing visions, while in Great Britain and America such popular prophets as Charles Dickens were lashing abuses, breaking down intrenched officialdom, and rending consecrated cruelty. It was that era of political liberalism which culminated in the English Reform Bill, the Continental Revolution of '48, the freeing of Italy, the Emancipating of Russian Serfs, and the American Civil War; while behind these great movements there advanced haltingly, at times timidly, often mistakenly,—as Brook Farm could testify, — but always surely, that deeper, more wide-reaching wave of social liberalism, which was beginning to teach men that a drunkard is not a noble fellow; that a bully is not a hero; that poverty is not a crime; that weakness is not contemptible; that labor is not disgraceful; that misfortune is not misconduct; that the maimed, the halt, and the blind should not expiate the sins of their fathers; that the love of nature, of little children, and of dumb creatures is not ignoble, and that the uplift of man is an undertaking worthy the best culture, the perfect science, and the lifelong effort of the finest minds. Such conceptions of a better humanity were in the making when Samuel Howe was in his prime.

Himself a leader of the silent revolution, he moved on from task to task; his clear intellect discovering new points of attack, his genius lighting the pathway to achievement.

In the last analysis the object of all human endeavor is human happiness. Howe was one of those rare

men to whom this truth is a present fact. He saw that happiness for the individual is in direct relation to the temperament, the experience, and the purposes of the individual. He aimed at relieving misery on a great scale, at raising to a higher level whole groups of men; but sanely he saw that cakes and ale suffice for most of us. Caviar and champagne are not necessary for humble souls. Nonsense-hubbub did not spur him to the impossible, nor the groans of cynics turn him aside from the work in hand. He was a prophet of fair play.

One conceives with difficulty the intellectual limitations of a person deprived of nearly all senses except the sense of touch. The state of a blind man is sad enough, but Howe's most famous pupil had neither sight, hearing, taste, nor smell. The training of such an unfortunate to a perception of the good things of life — to an appreciation of literature, music, and art — is incredible at first thought, but Howe succeeded in this astonishing task. His subject was Laura Bridgman, the famous blind deaf-mute, whom he found at Hanover, New Hampshire, brought to Boston when she was a child of eight, and educated at the Perkins Institute. Dickens describes the girl. That great man had a constant curiosity about and interest in schools, asylums, and prisons, making them the first object of his visits to new places. His delighted appreciation of the story of Laura Bridgman appears in a charming sketch.

For forty-three years Howe was superintendent of the Perkins Institute. That work is his monument; but like other busy men he found time for other things.

He became interested in the state of deaf-mutes, and in season and out he preached his convictions. Especially the feeble-minded among such children claimed his regard. He asked permission of the Asylum at Hartford to test his convictions there, but was refused. Then he undertook experiments of his own. With two feeble-minded, deaf-mute children as pupils in their own homes, he began quietly a system of simple instruction, teaching them easy and familiar arts by constant repetition and practice, until the doing of their tasks became to them automatic. Quickly parents were interested, and then enthusiastic. The interest of the children themselves was stimulated, and their feeble intelligence aroused. The investigation was soon placed beyond the experimental stage. Howe demonstrated that the children need not grow up helpless dependents, but in some fashion might become humble breadwinners; then he presented his scheme to the authorities of the commonwealth. The authorities approved; the legislature took action, and the small beginning developed into that useful institution, the Massachusetts School for Feeble-Minded Children.

One regrets that Howe had passed his prime when the Civil War came. I believe that at his best he would have been a great figure in that struggle. The double interests, emancipation and union, were certain to appeal strongly to a man of his training and sympathies. He became actively engaged in the antislavery movement as early as 1851, and for several years was an editor of the *Commonwealth*, a journal of that cause.

During the war he was employed as a member of the Sanitary Commission, and was busily concerned in establishing the Freedman's Bureau. It was all good, serviceable, inconspicuous work. He had then reached the age when an active man, with his reputation made, is in demand for everything from an after-dinner speech to the presidency of an insurance company, and Howe was unable to escape such burdens. In 1865 he was made chairman of the Massachusetts State Board of Charities, in which position he proved an untiring reformer, to the amazement of his breathless associates. His "General Principles of Public Charity" was a textbook, and is a classic still in demand.

In 1869 Howe had an experience which took him back to the scenes of his youthful crusade of forty years before. The Cretan insurrection of '66 was becoming an international problem. Greece was taking sides with Crete against Turkey, and the powers were bestirring themselves in the matter. But Howe was bestirring himself also. While cabinets were settling the status of the unhappy island, and handing it back to the gentle leading of Turks, Howe was organizing a relief expedition to feed and clothe the destitute people. He followed his plan of 1828; raised a large sum of money, loaded a ship with supplies, and visited Crete. His work there was delicate and hazardous, but he completed it, and saved thousands from starvation. Then he visited the Greek mainland, and learned to his delight that he was not forgotten there. The visit was a triumphal progress, for he found himself one of the immortals among those warm-hearted

people. At threescore and ten the freedom of cities is pleasant, and laurel still becomes the ancient brow.

That was Howe's last happily successful endeavor. He returned with added honors to America, and promptly was called to further public work. The federal congress was bestirring itself in the early throes of imperialistic ambition, and folk talked seriously of annexing the islands of the sea. Santo Domingo was their first object, and thither went Howe with other forlorn commissioners, by direction of President Grant. It was a situation of curious paradox, — the Apostle of Freedom, the Hero of Greece, and the Champion of Slaves, sailing away on a mission to annex the party-colored rabble of a farcical Carib republic. The object was a failure, as we know.

Howe came home, but went back later to the island, seeking health and forwarding a commercial enterprise. This expedition was a double failure, and our philosopher returned to Boston a broken man. His end was near. Much buffeting and novel strivings do not conduce to a peaceful old age. He died with little more ado, in his 75th year, on the 9th of January, 1876.

We have seen that here was a man of singular abilities, of noble aims, of quaint simplicity, of perfect courage. Among the great physicians of America his career is one of the most romantic and varied, and his accomplishments lasting. It is a name to be guarded in our annals, for he wrought and suffered much. In his native town they paid him public honors, and great ones of the earth told what he had done.

Here are the final charming words of Howe's old

friend, the poet-statesman Hoar: "His is one of the great figures in American history; I do not think of another who combines the character of a great reformer, of a great moral champion, of a great administrator of great enterprises, requiring business sagacity and wisdom as well as courage, always in the van, with the character also of a knight-errant who crossed the sea, like the Red Cross knight of old, to champion the cause of liberty in a distant nation. There was never on the soil of America, fertile as that soil has been of patriots and heroes and lovers, a more patriotic hero, a more loving knight."

STUDIES IN ANEURISM

HISTORICAL AND CRITICAL[1]

SAYS the learned Adams:[2] "It appears to me that at certain periods of ancient times, the standard of professional excellence was such as would not easily be attained at the present day. . . . The Father of Medicine held that, to become an eminent physician, it was necessary, not only to be well acquainted with the structure of the human frame, but also to be skilled in logic, astronomy, and other sciences. . . . His devoted admirer and follower Galen was evidently the very *beau ideal* of an accomplished physician; skilled in all the sciences of the day, in logic, mathematics, rhetoric, and the first philosophy; to all these ornamental branches of knowledge he added a minute acquaintance with anatomy and physiology; a practical experience with the phenomena of diseases; a singular perseverance in collecting facts; and an extraordinary ability for generalizing them."

Since the best of our forebears in medicine were such as Adams describes them, it is worth our while occasionally to glance back at what they did, that knowing their struggles and experiences we may more lucidly

[1] Address before the Cleveland Medical Library Association, December 16, 1907.

[2] Francis Adams: Editor of the "Seven Books of Paulus Ægineta"; Sydenham Collection, 1844.

and intelligently approach problems of our own day. The men as well as their problems go to make up a fascinating subject of study. Many of us have groaned perhaps over these matters, because the light of heaven has been obscured by pompous interpreters, by dull pedants, by dreary translators. But truly we must believe that those ancients were real men — those worth knowing; and that they attacked their problems often in fine, spirited, sane, and knightly fashion.

We in these days, with our somewhat feeble, formal, and spiritless manner of reviving studies in the history of medicine, are wont to dwell overmuch on the *lives* of men, and to make a perfunctory rehearsing of their detailed *endeavors*. But may not the history of an endeavor interest us? — a great endeavor which has engaged our ablest minds through twenty centuries, — a great endeavor which has been made a luminous accomplishment, at last, by men of our own time?

Throughout history the mystery of the circulating blood, — its nature, its course, the character of its components, the artful concealment of its source and forces, — has fascinated and baffled philosophers and scientists. To the old writers the heart and blood vessels seemed the noblest parts of man; — making up a mechanism and a system, constant, perpetual, wondrous, inexplicable, vital. We have been told that hidden, divine forces control this system; almost down to our own time the liquor sanguinis itself was held to contain intangible elements, which writers, groping blindly, were content to describe as "spirits"; and the ebb and flow of the life stream were for thousands

of years the theme of speculation, discussion, and marvel. If the nature of the blood and its vehicles was obscure to the physiologist, we must understand that to the physician and the surgeon the diseases of the blood and blood vessels were still more difficult of comprehension, so that we find no one department of the complex problem more troublesome or hotly debated than the subject of *aneurism.*

Galen is the first writer to describe it, and this is his definition: "When an artery is opened, the disease that occurs is called aneurism. It happens in consequence of the skin in the neighborhood of a wounded artery cicatrizing, whilst an ulcer remains in the vessel," and again, "An aneurism is a dilation or relaxation of a venous vessel, or a dispersion of the spirituous matter under the flesh, where it diffuses and distributes itself by jerks." [1]

Contrast Galen's writing of the second century with that of Roswell Park, published this year of 1907: "An aneurism is a tumor communicating with an artery, and containing circulating or coagulated blood, or both." In 1825 Astley Cooper wrote: "An aneurism is a pulsating tumor communicating with the interior of the heart, or of an artery, and containing blood." Galen's statement is interesting and the man was a remarkable man. By the average reader of surgical literature his name is coupled with that of Hippocrates, and the two are pigeon-holed as admirable personages doubtless, but of no immediate interest to us.

Now Galen lived *five hundred years* after Hippoc-

[1] John E. Erichsen, Translator.

rates; in a world differing from that of his famous predecessor as much as the world of Theodore Roosevelt differs from that of Sebastian Cabot. Galen was a man of good birth, careful university training, and rare culture; and, fortunately for science, perhaps, he was a Greek, though many of his adult working years were passed in Rome. Galen was a contemporary of Marcus Aurelius, which places him for us therefore in the second century A.D.

The fundamental reason for Galen's great and sustained reputation is his constant employment of demonstration and his insistence upon rational and intelligible evidence. Hippocrates had confined himself to bedside investigation. Galen went beyond that; he developed further his Alexandrian training, and practiced and taught laboratory methods through animal experimentation. He was truly our first great physiologist, and he was a surgeon as well.

Perhaps his most famous discovery, and the one for which he is best known, is that of the true function of the arteries. Previously men believed arteries to contain air, as their name implies. Galen recognized the fact that arteries in the *dead* appear to contain air, but he demonstrated by the double ligature of an artery on a living dog, and subsequent section of the vessel between the ligatures, that the artery is distended with blood. He observed too, that arterial blood differs from venous blood, and this phenomenon he ascribed to the entrance of some vital element or spirit of the atmosphere through the lungs into the arterial system. So he himself and his successors for centuries, when

describing arterial hemorrhage, were wont to speak of an outpouring of blood and *spirits*. More remarkable still, he asserted a fact which even Harvey, fifteen centuries later, did not state, — that there is a terminal communication between veins and arteries; and he used our present word *anastomosis*.

Here was a man, therefore, qualified properly to discourse upon aneurism; and doubtless his observations would have equalled in value those of eighteenth century Haller if only he might have seen frequent cases of the disease, or have turned his mind vigorously to its study. As it was, he failed to recognize the nature of true aneurism, so that his givings-forth, backed by the influence of his great name, misled surgeons for centuries. His definitions confuse us, but their upshot seems to be that he recognized what we call false aneurism only — a mass of blood and clots poured out into the tissues, and fed through a rent in a wounded artery. And he seems to apply the term "aneurism" to a dilated vein also.

Says John Hunter, writing in the eighteenth century, "There is no such thing as a false aneurism;" and our own Matas said truly the other day, "The false traumatic aneurisms are simply circumscribed, diffuse collections of blood, or pulsating hæmatomas." The modern conception of a true aneurism as a diseased and locally dilated artery, certainly was not clear to Galen. Nor was it clear to him in just what way his kind of aneurism should be treated. He was familiar with the use of the ligature to control hemorrhage; — witness that double ligature of the dog's artery, — but

he appears to have contented himself with seeking to cure aneurism through cutting off its blood supply by external pressure.

In all our discussions of ancient surgery and the apparent timidity of those surgeons, we must remember constantly that they knew not anæsthesia, and faced conditions of frequent sepsis.

That is a trite saying which I inject here not so much for the sake of exalting modern accomplishments in comparison, as to express my deep admiration for the accomplishments of the ancients, with all their disadvantages. We must remember in this connection, however, that although in former times sepsis seems to have followed operations upon human beings, experimental operations upon animals seldom were followed by sepsis, — an observation frequently made in our modern laboratories of surgical research.

We have seen then that Galen did make an important contribution to knowledge of the nature and functions of blood vessels, although he added little directly to the study of aneurism.

Roman Antyllus followed Galen, — indeed, for what we know, he may have been Galen's pupil; he lived in the third century, yet his suggestions and practice resemble those of our own day. He took advantage of Galen's teaching, — that we may control hemorrhage from an artery by tying the artery above the wound, — a procedure which seems as obvious to us now as the damming of a river in order to turn aside its lower currents. But Antyllus did not perceive the full significance of Galen's teaching. He tied the

artery immediately above the aneurism; then, mistrusting his own judgment, he went further, and after placing a second ligature close below the aneurism, he opened the aneurismal sac, evacuated the clots and allowed the wound to heal by granulation. It is doubtful if Antyllus even appreciated the character of true aneurism. We know of his work through the quotations of Oribasius only, and Oribasius seems to have believed that false aneurism, as we call it, was the only form of aneurism. When we contemplate the limitations under which the ancients worked, this misconception is not surprising. They were rarely permitted by law to dissect, or even to examine, the dead. Their observations upon true aneurism were made after the disease had nearly completed its fatal cycle. Such rare true aneurisms as they saw *post mortem* had ruptured, filling the surrounding parts with blood and clots, so that naturally the observers conceived the rupture and the outpouring to be the essential feature, the partial dilatation of the artery to be insignificant or merely coincident. Students of medicine regret the scanty extent of our knowledge of Antyllus. We know inaccurately that he lived in the third century, but we know nothing definite of his life and circumstances. He appeared upon the scene and he left it, with small chronicle of his doings, save the general report of his great learning, his incessant activities, his unusual operative ability, and his famous treatment of aneurism. After him two great surgeons of antiquity, Aëtius and Paulus, appeared and worked and disappeared, leaving their brief record. The former especially concerns

us. With them the story ceases until we come down almost to modern times.

Aëtius is curiously interesting, little as we know of him. He lived in the sixth century, he wrote abundantly, and his account of aneurism shows that in the years succeeding Galen some men had come to recognize in a fashion the nature of true aneurism; for Aëtius remarks: "The signs of aneurism are a tumor, without discoloration of the skin, or pain, soft to the touch, having a loose spongy feel, and yielding in such a way to the pressure of the fingers that it almost disappears; but returning again, on the fingers being removed, which is very evident in those aneurisms that have arisen without a wound." Again, "or if the mouths of the arteries be burst open, the blood and spirits then being gradually poured forth collect under the skin." From this one concludes that Aëtius recognized at least two forms of aneurism, the true and the false. He thought he had discovered another and peculiarly significant form of aneurism also — an aneurism of the neck associated with pregnancy, interesting to us now especially in view of present knowledge of exophthalmic goiter. He calls this a dilatation of the vessels, most frequently met with in the throat, where it gives rise to a tumor that may commonly happen to women in the child-bearing period. So one sees that two hundred years after Antyllus, even, the nature of aneurism was not altogether clear. Men were still discussing its causes also; but observe that they had made a notable advance in its treatment; for mark the brilliant suggestion of Aëtius in the sixth

century, — a suggestion for treatment which John Hunter, all innocent of plagiarism, redevised and simplified twelve hundred years later. Aëtius tells us that in certain specified cases, in aneurism of the limbs for example, we shall tie the artery high above the disease, after which we may safely open and evacuate the tumor. This plan of Aëtius arose directly from the teaching of Galen, for Galen had demonstrated arterial anastomosis. Galen saw that the main arterial trunk is not the sole feeder of blood to the limb, so that even when the main artery is tied, then will the smaller arterial branches dilate, and blood be carried by a roundabout course to the tissues demanding it. So far Galen had seen clearly, but he had not grasped the essential corollary, — the bearing which arterial anastomosis has upon the *treatment* of aneurism. Aëtius or his associates dimly perceived the truth. Here are his directions for the cure of aneurism at the bend of the elbow: "In the first place, having marked the course of the artery from the armpit to the forearm, we are to make a simple incision, three or four fingers' breadth below the armpit along the inside of the arm; and having laid bare the artery, to seize it with a blunt hook and bind it with two ligatures; after which it is to be divided between them and the wound filled with fine frankincense. The swelling at the bend of the arm may then be opened without any fear of hemorrhage. When the coagula have been cleared away, the artery from which the blood is discharged is to be seized with a hook, secured, and divided like the former." To be sure, this is not the operation of

Hunter, but it approaches Hunter's method more nearly than do other methods of old time.

Curiously enough none of those ancient writers discourse upon sepsis and gangrene so earnestly as do the men of more recent times. Galen, Antyllus, and Aëtius urge forcefully the value of various methods of operating, and seem to imply their relative safety. The subject of sepsis enters but little into their theme when they deal with wounds. Perhaps we may assume that sepsis was less prevalent among the ancients, whose habit of body was clean, fresh, and vigorous by law and custom, than it came to be among mediæval and early modern men to whom the bath was little known.

With the death of Aëtius the progress of ancient surgery ended. There were other men, of course, — Paul of Egina, and Oribasius of Constantinople, — voluminous writers and critics; but they failed to advance knowledge. Yet knowledge of aneurism was already considerable, as we have seen; that aneurisms are true and false; that anastomosis exists; that compression of the artery will promote healing of the aneurism; that ligature and incision will cure, and that ligature alone will control hemorrhage. With such knowledge solution of the problem rested for centuries.

Through the Middle Ages also surgical progress languished, though writers tell us much of the accomplishments of the Arabians, — Albucasis, Rhazes, and Avicenna; but those Arabians, though active-minded and ingenious, were little other than compilers of former knowledge. They originated no new thing in the understanding or treatment of aneurism. So we

come down to the days of the revival of learning, — the fifteenth and sixteenth centuries, and to such men as Fernelius, Gorræus, and Paré. The works of Galen were somewhat familiar to those surgeons, who had little knowledge of any other ancient writer; and being thus innocent of former things, they seem to have developed a joyous curiosity in delving and inventing for themselves. Johannes Fernelius, the thoughtful German surgeon, wrote in 1542: "An aneurism is the dilatation of an artery full of spirituous blood. . . . It is scarcely credible that some imagine that in these affections the vein or artery is ruptured or opened, for if the blood had escaped from the vein or artery it would soon putrefy and give rise to a tumor of a different kind." That is the description of a true aneurism, and is followed by a curious note of disbelief in Galen's statements. Fernelius wrote after the introduction of printing into Europe, in a time of gay lightheartedness among the nations; but printing had not yet diffused knowledge. One wonders betimes what became of the great Latin folios turned out from the early presses, and to what public they were brought. There was Fernelius denying the existence of what we call false aneurism; but listen to the ingenious Gorræus, writing twenty years after Fernelius, — writing as though Fernelius were to him a name unknown. Thus Gorræus: "An aneurism is a tumor, soft to the touch, yielding to the pressure of the fingers, and occasioned by blood or spirits poured out from an artery or vein; . . . the vessels being distended, give way; or from the vessel being divided with the superficial skin,

whether accidentally or by the unskillfulness of a surgeon in bloodletting." Gorræus goes on to remark that aneurisms can be cured with great difficulty only, but he does not tell us how.

The great Ambroise Paré was a contemporary of these men, and Paré too had his notions about aneurism. Curiously enough, and unlike his usual original and clear-thinking self, he writes with little personal knowledge of the disease, so that one finds his statements on the subject to contain a curious medley of other men's hypotheses. Yet Paré is a man we should know. If one were to ask the average reader of medical literature why Paré is famous, he would be told, — because Paré invented the ligature. But Paré did no such thing. Have we not seen Galen and others tying arteries? They tied them in continuity, however. Paré introduced the distal ligature of arteries in amputation stumps. We all recall the painting of Paré on the battle-field, waving aside the zealous assistant who offers him the iron, red-hot from the furnace; waving him aside, and holding up the famous ligature.

We think of Paré as the greatest clinical surgeon in history; the first of an illustrious surgical line. The son of a nobleman's servant, he was born in 1510 into his father's humble world. But the boy showed great qualities from the start. He was clear-seeing, nobly ambitious, straight-thinking, tireless. He despised pedants and meaningless authority, though he grew to suffer fools gladly. Yet his respect for just authority was constant, and his human sympathy was instant and boundless. Apprenticed early to a barber surgeon, —

one of that pathetic lower order of the medical profession as it then was — he served for years in the famous Hôtel Dieu, that old Paris hospital, and was a pupil of Jacobus Sylvius. Then, as a licensed barber-surgeon, he joined the army, and with the army, or in civil life, he practiced for more than fifty years. Almost at once he perceived the barbarous futility of the customary hot oil applications to fresh wounds; and partly by chance, but guided by sound reasoning, he substituted a simplified treatment, — soothing ointments, bandaging, and rest; — a revolution in surgery accepted at first by the surgical world and then forgotten, to be revived from time to time by such men as Wiseman, Petit, Le Dran, and the great Larrey; but empirically, until at length our own generation has learned the truth and justness of Paré's teaching. His great discovery of the use of the ligature in amputations was made in one of his campaigns. Listen to the passage from his famous "Journeys in Diverse Places": "Here I confess freely and with deep regret that formerly I practiced not this method but another. Remember, I had seen it done by those to whom these operations were intrusted. So soon as the limb was removed, they would use many cauteries, both actual and potential, to stop the flow of blood, a thing very horrible and cruel in the mere telling. . . . And truly of six thus cruelly treated scarce two ever escaped, and even these were long ill, and the wounds thus burned were slow to heal, because the burning caused such vehement pains that they fell into fever, convulsions, and other mortal accidents; in most of them more-

over, when the scar fell off, there came fresh bleeding, which must again be stanched with the cauteries, which, thus repeated, consumed a great quantity of flesh and other nervous parts. By which loss the bones remained long afterward bare and exposed, so that, for many, healing was impossible; and they had an ulcer there to the end of their lives, which prevented them from having an artificial limb. Therefore I counsel the young surgeon to leave such cruelty and inhumanity, and follow my method of practice, which it pleased God to teach me, without I had ever seen it done in any case, no, nor read of it."

Such a man should have given us some new light on aneurism; but he does not appear to have thought deeply on the matter. Yet his writings on the subject have their peculiar interest, and their own robust flavor. He observes: "An aneurism is a soft, compressible tumor, occasioned by the blood and spirits being effused under the skin." "They may occur in any part of the body, but principally in the throat of women who have difficult labors."

Paré tells us that we cannot cure large aneurisms of the armpit or groin, "for on cutting into them so large a quantity of the blood and vital spirit escapes that the patient dies." Here is his delightful account of a case: "This I have sometimes seen, and lately in a priest of St. André des Arts, by name Jean Mallet, living in the house of Monsieur de Thou, first president. This priest had an aneurism, about the size of a walnut, upon the shoulder-joint; and I advised him, as he valued his life, not to have it opened; but on the

contrary to use the ointment of balo, and compresses dipped in the juice of mulberries and houseleeks mixed with fresh cheese, and other cooling and astringent things, and to apply a plaster to prevent its rupture, with a thin plate of lead, and to wear short sleeves, so that his pourpoint might serve as a ligature to compress the tumor with. Also to avoid everything that might render the blood more liquid, and even to abstain from singing with too loud a voice at St. André, as he was accustomed to do. He followed my advice for a whole year; but notwithstanding this, the tumor increasing in size, he went to a barber, who, thinking that his aneurism was only a species of abscess, applied a caustic overnight in order to open it. On the following morning, the opening was made, and a large quantity of blood escaped; at the sight of which, being greatly alarmed, he cried to the president's wife to send for me in order to stanch it, telling her at the same time that I advised him not to have it opened; but before I could reach him, he had expired. I, therefore, would advise the young surgeon not to open aneurisms, provided they be not very small, and situated in parts that are not very important; in which case he may divide the skin above them, and, separating the artery, pass a seton-needle armed with a strong thread under it, and allow the ligature to fall of itself. Nature will then generate flesh, which will block up the artery."

All this brings us no nearer to an understanding of true aneurism. The debate went on, and we come upon the famous English surgeon Wiseman, of Charles II's time, quaintly writing in 1676: "An aneurism is

an ecchymosis; . . . authors have supposed the blood to have burst its passage through the first coat (of an artery), and dilated the second, thereby raising the tumor. . . . This I myself was taught, and some while believed, but . . . now I am apt to believe there is no such thing . . . but that it takes place from the blood bursting quite through the artery into the interstices of the muscles." Now, Wiseman is a writer full of curious saws and merry anecdotes, not always told to the credit of his colleagues or of mankind in general. But he himself helped not at all in solving the aneurism problem. Compresses and foolish applications were his stock-in-trade; and he relates a tale of an aneurism punctured, drained, and packed by a fellow-surgeon who healed it eventually by such means. Yet nearly a hundred years before Wiseman, the Paris surgeon Guillemeau gave out this pregnant saying: "With regard to the treatment, the simple ligature of the artery (well above the disease) is of service, more especially if the aneurism be somewhat large."

Wiseman recognized especially a peculiar form of traumatic false aneurism, appreciation of which runs back beyond Galen's time; false aneurism at the bend of the elbow, due to careless opening of the brachial artery, during the little operation of venesection. The question of treatment for such false aneurisms continually had exercised ingenious men, but note this; none of them recorded his recognition of aneurismal varix; we hear them tell of brachial *false aneurism* only, until we come to the elder of the great English Hunters in the eighteenth century.

One may fancy, however, that some understanding of aneurism was developing during the years of the revival of science. More and more, through the sixteenth, seventeenth, and eighteenth centuries, faithful and talented men were devoting their lives to investigations of biological problems, — some few men to the problems of surgery, many to those of physiology and anatomy. We look in vain, however, to such scientists as Vesalius, Malpighi, and Harvey for any authoritative givings-forth on the great question of aneurism; — especially to Harvey do we look, but he was otherwise employed. Lancisi, indeed, the great Roman clinician of the early eighteenth century, wrote an elaborate and searching treatise on aneurism, but his especial claim to aneurismal fame seems to lie in his friendship for the much-talked-of Anel of Turin, whose operation for aneurism is still quoted in our books. Lancisi founded a great public clinic and did more than any other of his day to forward the cause of bedside teaching, — unless we except Boerhaave of Leyden. So students and surgeons flocked to Rome; and the genius of the eminent man there inspired their later labors, which bore fruit in fields untilled by the master himself. Lancisi was the Billroth, the Paget, the Bigelow of his day.

Lancisi's friend Anel was a disputatious, bumptious, assertative person, given to self-praise, as, alas! were many of his professional brethren in those Philistine days; but he won the regard of Lancisi; though the latter without a sigh saw him depart from Rome. Here is a letter from the great Italian to a correspondent in France.

"ROME, May 22, 1710.

"SIR, — This letter will be delivered to you by M. Dominique Anel, a Frenchman by birth. This traveller has shown, during his stay in Rome, that he is very learned in anatomy and surgery, and most skillful in operations; and that the dexterity of his hands is incomparable, by the facility with which he tied the artery in the arm of a poor friar, who was on the point of death in consequence of a true aneurism, which was every moment ready to burst; this I myself saw. The friar is now cured, and enjoys perfect health. I was surprised to find that the cicatrix was of such small extent, so that it is scarcely perceptible, and does not, in the least, interfere with the movement of the arm. You will favor me much by receiving this skillful person amongst the number of your friends; and by receiving him well, as it pleases me to see that those who are endowed with great virtues, and possess superior talents, are esteemed by those who are as talented as yourself. Knowing you as well as I do, it appears useless for me to inspire you with such sentiments, as I am aware that you do everything in your power to favor those who excel in science and art; and that, consequently, you will not refuse your esteem to M. Anel. Should he give you a copy of a book that he has written and printed at Amsterdam, you will send it to me, by the first opportunity, with one of your dissertations. I await them with impatience. In the mean while, farewell.

"I am Sir, yours, &c.,

"LANCISI."

After a preface of much self-gratulation Anel tells the story of his famous operation, — an operation which seems to have been suggested to him by inspiration rather than by investigation and reason: "It was on the 30th of January, 1710, that I performed this operation on the friar in the presence of the above-mentioned gentlemen, who were all of my opinion, except Mr. N. N., who, when he saw that I had prepared the necessary dressings and instruments, asked me with an appearance of vexation if I had absolutely determined on performing the operation. I begged of him then to have a little patience, to examine the patient again with attention, and to recollect that we were there assembled to save the life of a man who was in great danger of losing it very shortly, unless we afforded him the best assistance of our art. I begged of him to second our good intentions without prejudice or jealousy; but seeing that he made more noise and became less tractable, I desired him, once for all, not to prevent me from doing what he either would not do, or did not know how to do himself. This did not stop him, he did everything in his power to disconcert us and to frighten the patient; finally, he left us, threatening the friars never to enter their convent again.

"This occurrence, which might have caused the patient to lose courage, as it took place in his presence, only served to redouble it, for he gave me his arm with much firmness, saying to my opponent as he was going away, 'May God guide you.'

"Having made myself master of the blood by means

of a tourniquet, I made an incision in the integuments, without touching, in any way, the aneurismal sac; I then sought for the artery, which I found situated below the nerve, which is not common. I took every precaution in separating it from this, and having lifted it upon a hook I ligatured it *as near to the tumor as possible.* The artery having been tied, I loosened the tourniquet; when a small muscular branch, which I had divided in dissecting the vessel, bled, and compelled me immediately to tighten the tourniquet and to tie the artery again a little higher up. The tourniquet being loosened I saw no more bleeding, nor any pulsation in the tumor. I then applied the proper dressings and a bandage."

He tied the artery close above the aneurism, as others had done before him. He had no thought for the laborious studies, the painstaking research, the ingenious reasoning, and the sound conclusions which distinguish the great subsequent achievement of John Hunter, with which the so-called *operation of Anel* has been compared.

During all those years in which surgeons were experimenting with various operations upon aneurism of the extremities, they had discovered the existence of internal aneurism also, — aneurism of the heart, the aorta, and other large vessels. Many observers claimed that they had cured such aneurisms. Lancisi himself discourses extensively upon this topic, and relates the interesting case of "the Marquis Litta of Mediolana, a studious young man, of melancholic temperament, who suffered from great pulsation in the celiac artery

and in the lower part of the aorta, with breathlessness and oppression about the heart. He was treated with emollients, mixed with oil of almonds, fomentations, soft water baths, diluents and asses milk, by which means the tumor disappeared entirely, and the patient lived afterwards for sixteen years." Lancisi tells of many other cases, quoting especially the famous cure by Severinus of Charles IX, who suffered from aneurism, and was recovered completely by measures directed towards diminishing the mass of the circulating fluids; by bloodlettings and mild solvents, together with pleasant diluents, such as decoctions of borage, of wild lettuce, and the like; with *nitrum stibiatum;* and at the same time a strict diet, the cutting off of eating and the prescribing of extremely small amounts of fluids. Says Lancisi: "It will be sufficient for the surgeon to direct his efforts to prevent the blood from becoming too abundant. . . . Nor should we despise vulnerary decoctions, which may be ordered for several days after the venesection, in order that the vessels and fibres may be strengthened."

Surgeons of that time were beginning also to recognize constitutional disease as a cause of aneurism, and to ascribe dilatation of the arteries to syphilis. Guattani was a distinguished surgeon of Rome and a successor of Lancisi. Writing in 1772, he describes a Roman grave-digger named Andreas Boturri, twenty-five years of age, who came under his care. Boturri was of a moderately sanguine temperament, of a slender habit of body, was marked by several syphilitic scars, and was the victim of a popliteal aneurism.

Guattani cured him by the operation of Antyllus. The Scotch surgeon Adolphus Murray recounts another case of Guattani's, which had a less fortunate outcome. The story is that of a groom, "who having received many wounds in the warfare of Venus" suffered from a true aneurism, which appeared near Poupart's ligament. The surgeon thought best to treat the disease by compression, but the warrior-groom became restless, the tumor increased, when the surgeon boldly undertook an operation, but the patient, being seized with gangrene, died on the third day.

The literature of aneurism [1] abounds in such anecdotes, grave and humorous; but perhaps one of the most interesting, in view of recent methods of treatment, is that of Morand, the well-known French surgeon, who published in the "Memoirs of the Royal Academy of Surgery" in 1753. Morand recognized the value of the ligature tied above the aneurism, and remarks that common sense has suggested this means; "it was practiced long before the discovery of the circulation of the blood; Hippocrates, Galen, and Avicenna mentioning it." But observe especially Morand's description of Brossard's method. Brossard was a surgeon of La Chatre, in Berry, who in 1750 proposed an interesting method of closing the arterial openings within the sac of the aneurism itself, thus obviating the well-known dangers of ligature. Morand called Brossard in consultation to treat a case of which he

[1] John E. Erichsen, "Observations on Aneurism," selected from the work of the principal writers on that disease; London, printed for the Sydenham Society, 1844.

tells the following story: "An officer in the service of the Prince of Conty was sent to me by H. S. H. to be treated for an aneurism of the right arm. . . . The tumor was nearly as large as two fists. . . . After having blooded the patient twice, and kept him upon a strict diet for a few days, I performed the operation on the last day of the year, in the presence of M. de la Martinière and a numerous assembly of surgeons. Having applied a tourniquet, I laid open the aneurismal tumor by a large incision. I then removed the clots and the fluid blood contained in the sac and exposed the artery; . . . the vessel was found to have been dilated. After having observed the opening in the artery M. Brossard laid his remedy against the vessel and begged me to apply over this a proper bandage." This case seems to have been one of false aneurism due to a sword thrust through the brachial artery, but the method of sealing the open artery was thought to be applicable to other forms of aneurism. The remedy of Brossard was the fungus agaric, which grows especially upon old oak stumps. The surgeon prepared this material by beating it into a sort of foil. He then laid the foil, or leaf, over the open artery, to which the agaric clung tenaciously, sealing the vessel. Packing and a bandage completed the dressing, and Morand claims distinct success from its use.

Interesting as is Brossard's method of closing an open or wounded artery, the operation of arterial suture by Lambert, an Englishman, undertaken eleven years later, in 1761, is still more striking. Lambert was a surgeon of New Castle, and a correspondent of

William Hunter; his lively description presented such stimulating reading that his letter relating the following experience was published in London, and was widely circulated.

Lambert wrote to Hunter: "I recollected all that I had seen or read of the effects of styptics, of pressure, and of ligature in the cure of hemorrhage. I considered the coats and motions of arteries, and compared their wounds with the wounds of veins and other parts. . . . And I considered in particular how the union of divided parts was brought about in the operation of the harelip and in horses' necks that are bled by farriers. Upon the whole I was in hopes that a *suture* of the wound in the artery might be successful; and if so, it would certainly be preferable to tying up the trunk of the vessel. . . . To Mr. Hallowell I recommended the method I have hinted. He put it in execution June 15, 1759. Everything was done in the usual method till the artery was laid bare and its wound discovered; and the tourniquet being now slackened, the gush of blood *per saltum* showed there was no deception. . . . Then a small steel pin, rather more than a quarter of an inch long, was passed through the two lips of the wound in the artery, and secured by twisting a thread around it, as in the harelip. This was found to stop the bleeding, upon which the arm was bound up and the patient put to bed; . . . the pin came away with the dressings on the fourteenth day; and on the twenty-third day every part was healed." On July 19, five weeks after the operation, Hallowell's patient was discharged from the hos-

pital, perfectly well, and with a pulse in the affected arm nearly as strong as in the other.

I protest that this account by Lambert is of supreme interest to-day. It is the first record I have found which describes, or even suggests, the suture of a blood vessel, and one marvels that the immediate success made so little subsequent commotion. The surgeon took up all coats of the wounded vessel, which we have learned to be the proper method, so that the immediate union of intima to intima, while the vessel wall was supported on the pin, is not surprising. Fortunately the wound healed *per-primam*. It may be that fear of sepsis and secondary hemorrhage deterred other surgeons from following Lambert's example.

We have now reached in our studies the last half of the eighteenth century. New names and accounts of frequent experiments crowd the text. False aneurism was extremely common in those eighteenth century days, and true aneurism appears to have been seen more frequently than now. The great Haller of Göttingen and Bern, lecturing in the earlier decades of the century, had made clear to surgeons the distinction between true and false aneurism, though in some fashion many men before Haller's time had appreciated that distinction. Most of the well-known eighteenth century surgeons were performing some variety of ligature operation, — following the method of Antyllus or of Anel; but curiously enough, as we come down towards the time of the Hunters and to the end of the eighteenth century, we find some experienced teachers grown weary of the ligature, and asserting that the only safe treat-

ment for aneurism of the limbs is amputation. The great Pott, — Percival Pott, — in 1779, insisted strongly upon the importance of amputation in certain cases.

Pott is one of those delightful characters who appear from time to time in surgical history. He was personally attractive; a sound, clear-thinking man, full of original opinions, energetic and industrious. Every medical student knows how, when a young man, Pott fell down in a London street and broke his ankle; and lay there, studying the nature of the injury, until he had formulated in his own mind a clear conception of that thing known to us as "Pott's fracture." For more than a generation, in the middle of the eighteenth century, he was the greatest surgical authority in England, until the rise of his pupil John Hunter overshadowed him. Pott was a great clinician, perhaps the last of the Paré school. To Pott, sepsis and gangrene were ever present horrors, and his dread of those calamities led him to his pronounced convictions on the treatment of aneurism. He wrote in 1779: "If a man was to answer from theory (regarding the treatment of aneurism), he would say that the skin is to be divided . . . and the artery to be tied above and below the dilatation. . . . Sorry am I to find myself obliged to say that, as far as my observation and experience go, such an operation, however judiciously performed, will not be successful; that it will not save the patient's life. . . . Nor have I ever seen any other operation than that of amputation which has preserved the life of the patient." Pott's opinion was not accepted cheerfully by all his colleagues, and one reads of many

English surgeons who rejected his teaching, because on the one hand they found abundant evidence that ligature frequently does suffice; and on the other hand because, as they asserted, aneurism sometimes is multiple, so that the amputation of a leg for popliteal aneurism must be valueless, and a cruel mutilation, when the patient suffers at the same time from femoral, iliac, or brachial aneurism. The debate waged hotly, especially in England, throughout the eighteenth century, while through the debate and through experimentation men were coming to a just appreciation of the nature of aneurism, of its various forms, and of modes of treatment.

William Hunter was born in Scotland in 1718, the brother of John Hunter and ten years his senior. We connect John Hunter's name with a great operation for aneurism; but William Hunter, too, made an important contribution to the subject. In 1761, when forty-three years old, and during his younger brother's absence with the army, William Hunter wrote: "In a former paper upon the aneurism I took notice of a species of that complaint which so far as I know had not been mentioned by any authors, viz. where there is an anastomosis or immediate connection between the artery and vein at the part where the patient had been let blood, in consequence of the artery being wounded through the vein; so that blood passes immediately from the trunk of the artery into the trunk of the vein and so back to the heart." In that writing we have our first description of aneurismal varix, with William Hunter as its discoverer. Other surgeons since Galen's

time had written of false aneurism due to wounding the brachial artery by the surgeon in venesection, but none of them had described an arterio-venous anastomosis. William Hunter not only recognized aneurismal varix, but appreciated its relative harmlessness. He describes a number of cases and tells us how a patient may bear pulsating veins in his arm through a long life, without special discomfort or danger.

William Hunter did many other things, notable to surgeons, for which one should remember him: he founded a great school of anatomy; he explained in a famous book the nature of the placental circulation, and he established by will the Hunterian Museum of Glasgow, his Alma Mater. He was the brother, teacher, and patron of John Hunter, and for these things perhaps he is best known to us.

The student of aneurism may not pass by John Hunter without some interesting thought on the nature, caliber, and work of that great man. One struggles vainly to conceive and to summarize the significance and the magnitude of his life and accomplishments. His greatness lies not in his labor, in his enthusiasm, in his diligence, in his eccentricities, or in his popularity. Other men have exhibited these qualities. He was a profound and original thinker who realized deeply the immaturity of science; who struggled sanely and boldly to remedy its defects; who founded a great school of surgery; who popularized and made possible a great forward movement in medicine. He was a luminous, persuasive, and inspiring teacher; a close, accurate, and clear-headed observer; a diligent and re-

sourceful practitioner; a daring, brilliant, and conservative operator; a lucid, striking, and convincing writer. But we are concerned only with his contributions to the study of aneurism.

John Hunter was a great physiologist. I know of no surgical life more rich in suggestion to the surgical physiologist of to-day than is that of John Hunter. His work in the physiological laboratory grew out of his interest in comparative anatomy. He was an incessant vivisector as well as a dissector of dead animals, so that his appreciation of the appearance and action of living structures and organs was unrivaled. Hunter undertook intelligently a study of aneurism, and sought rationally a cure. In one of his lectures to students he said: "By an aneurism, then, I understand the dilatation of the coats of an artery, arising probably either from disease or accident, producing weakness, which becomes the remote cause, while the force of the circulation is the immediate cause. . . . It must in fact in all cases arise from a disproportion between the force of the blood and the strength of the artery." He asserted that an aneurism proper is not caused by the weakening or destruction of one of the coats of an artery, with consequent dilatation of the remaining coats, and to prove this he performed an interesting experiment on a dog. He cut down upon the animal's carotid and removed carefully the artery's coats until there remained the intima only, through which he could see the blood coursing. Then he sewed up the wound, leaving in its depths this weak-walled vessel, expecting that an aneurism or a rupture

would result. The dog returned promptly to a cheerful life, and, so far as the experimenter could observe, nothing happened. When he killed the animal several weeks later, he found to his surprise, as he says, that "the sides of the wound had closed on the artery, and the whole was consolidated to and over it, forming a strong bond of union so that the whole was stronger than ever."

This experiment, with others of similar nature, led Hunter to the belief that something more than a wound or mechanical weakening of an artery is necessary to produce aneurism. He became convinced that actual disease of the vessel is a *sine qua non*. Indeed, he denied the existence of so-called false aneurism, which must be regarded merely as a pulsating hæmatoma from traumatism. In like manner he pointed out that a ruptured true aneurism must not be regarded as giving rise to false aneurism. When a true aneurism ruptures, a true aneurism remains, complicated, however, by a rent in the sac and a pulsating hæmatoma.

Hunter next turned his attention to the extent of disease of a vessel affected by aneurism, and came to appreciate that frequently the actual dilatation does not necessarily represent the total extent of the disease. Frequently an artery is weakened by atheromatous or syphilitic processes for a considerable distance above and below the site of the actual swelling. This condition explains the fact that a ligature placed immediately above the aneurism or immediately below it, according to the method of Antyllus, fails often to effect a cure, because the disease of the vessel progresses,

the ligature does not obliterate, and secondary hemorrhage follows. Moreover, Hunter asserted that the operation of Antyllus and others of his predecessors, dealing as it does with diseased vascular structures, is prone to set up severe inflammatory reactions, causing extensive swelling of the limb and a consequent blocking of the necessary collateral circulation, with frequently resulting gangrene of the distant parts. In this connection one pauses to reflect that the conditions in the operation of Antyllus, to which Hunter objects, are quite different from those present in the modern operation of Matas, which I shall describe shortly. In the modern operation the surgeon deals with patients who have been thoroughly treated for their syphilis, if syphilis exists; moreover, in operating to-day, our asepsis eliminates the old-time infections.

Hunter's next interest was in the question of anastomosis; and one bears in mind that he is discussing aneurisms of the femoral, the popliteal, and the brachial arteries only. He remarks incidentally that other vessels subject to aneurism have either an abundant collateral circulation or are beyond the reach of surgical operations. He came to appreciate the nature of collateral anastomosis, through an interesting experiment upon a stag, — an experiment made in connection with another investigation. He had been granted the privilege of using the wild creatures in the Royal Park at Richmond. On one occasion he directed to have caught a deer, and he tied the animal's external carotid artery on one side, in order to watch the effect upon the corresponding antler. After applying the

ligature he observed that the antler, then half grown, became immediately cold to the touch; and he debated with himself whether the horn would be shed, or retained longer than usual. Some weeks afterwards, on examining the animal again, he found that the wound was healed, and that the antler was warm and growing. His first thought was that the ligature had slipped, but after killing the deer and making a careful dissection he discovered the external carotid obliterated at the point of ligature, while a number of small tortuous neighboring vessels had enlarged, and were carrying a proper blood supply to the horn, in the manner we should now expect. Some notion of the nature of collateral anastomosis had long existed, but this operation of Hunter's, followed by a series of similar investigations, demonstrated definitely and for the first time, the manner in which minute arteries may take up the burden imposed upon them by the ligature of a main trunk.

Such preliminary work of Hunter's led him to enunciate, in opposition to Pott, his pertinent query: "Why not tie it (the artery of an aneurism) up higher in the sound parts where it is tied in amputation, and preserve the limb?"

In December, 1785, there was admitted into St. George's Hospital, under Hunter's care, a coachman, forty-five years of age, with a popliteal aneurism, which had troubled him for three years. This patient gave Hunter the opportunity for which he had waited, and one month later, in January of the following year, in the presence of a large company of distinguished and

interested observers, that surgeon performed the first famous operation for aneurism by the Hunterian method. He opened down upon the femoral artery below the middle of the thigh, through that intermuscular space known since as Hunter's canal, and secured the vessel by a double ligature in a perfectly healthy area.

It is interesting to observe the subsequent history of this case. The wound became infected, as we should expect, but no serious amount of inflammatory reaction followed. As Home, Hunter's brother-in-law and biographer, reports, "The limb was found, some hours after the operation, not only to retain its natural heat, but even to be warmer than the other leg." The convalescence was slow according to modern ideas, for the patient could not leave the hospital until six weeks after the operation. For some months afterwards the cicatrix kept breaking down occasionally, and discharging a number of small threads; but by the middle of July, six months after the operation, the wound was permanently healed, and all evidence of the aneurism had disappeared. This first patient died of some other disease than aneurism about a year later, and Hunter was able to examine the limb. He found the little wound in the thigh to be sound, the artery partially obliterated above the ligature as far as the profunda, and the aneurismal sac shrunken to the size of a hen's egg, with its lower orifice entirely lost; and most interesting of all perhaps, numerous obliterated collateral branches enlarged and passing over different parts of the aneurismal sac.

Hunter's success in this case encouraged other surgeons to adopt his method, and in the ten succeeding years many similar cases were reported, — several successful, but some fatal. Surgeons came to feel that Hunter's method was a great advance on anything hitherto known, but they recognized that it had its limitations. The French surgeon, Deschamps, writing in 1797, records a number of valuable observations upon Anel's and Hunter's methods. He himself appears to have had unusual opportunities of seeing cases of aneurism, and he felt that upon the whole Hunter's plan was much the most satisfactory; for he writes, "We have had in Paris four cases in which the femoral artery was ligatured in the middle of the thigh for popliteal aneurism. Of these four operations one only, that by Chopart, has been followed by mortification of the leg." Deschamps appreciated that Hunter's operation gives less opportunity for collateral anastomosis than does the lower operation, but he felt that the lessened chances of infection by Hunter's method offset the other advantages of ligature close to the aneurism.

It is needless to pursue the discussion further, or to follow the literature through the century following Hunter's demonstration. After the first outburst of enthusiasm surgeons again became skeptical and conservative. Hunter's operation continued in vogue, though many of the older, non-operative methods constantly were resorted to. At one time in Scotland and England there was a revival of the Antyllian method, which was practiced with enthusiasm by

Syme and his followers; while even in our own time surgeons have treated aneurisms as benign tumors, and have excised them.

Boldness in tying arteries previously thought inaccessible was one interesting development of Hunter's teaching. During the first half of the nineteenth century many surgeons in America as well as in Europe devoted themselves to the subject of arterial ligature, with the result that an immense experience and a great new material were added. Hunter's pupil, Astley Cooper, tied many arteries for aneurism and wrote entertainingly on that theme.[1] In 1817 he performed his famous operation of tying the abdominal aorta, for aneurism of the common iliac. The patient died after forty hours. Valentine Mott, the eminent New York surgeon, and Cooper's pupil, was an incessant tier of arteries. Beginning with the innominate in 1818, he operated for aneurism one hundred and thirty-two times in all, that I have found recorded. Other surgeons conceived and practiced other methods in attempts to improve the treatment of aneurism. In 1760 the French surgeon Brasdor had introduced single ligature of the artery *beyond* the aneurism, with the notion that thus he might induce clotting in the proximal portion of the vessel. Some degree of success has attended this method in the case of innominate aneurisms otherwise inaccessible. Wardrop, in the nineteenth century, attempted to cure aneurism by ligature of one of the distal branches of the affected artery, — for example the posterior tibial for aneurism of the

[1] Tyrrell's "Cooper," Boston, 1825.

popliteal; but neither Brasdor's nor Wardrop's operations found any great favor with the profession.

The introduction of aseptic surgery in the last quarter of the nineteenth century improved the conditions of operating in the field of aneurism as in all other fields; and surgeons, thus fortified, attacked the problem with renewed hope; but their results did not meet their expectations. Skepticism returned and persisted. So lately as 1886 I saw a surgeon of wide experience treat a femoral aneurism by digital compression of the artery, long continued, while he explained that this method, uncertain and frequently hazardous as it is, is less dangerous than any method of ligature. During the early years of the aseptic period, however, it was found that extirpation or excision of the aneurismal mass is less dangerous than ligature. Here are Delbet's figures summarized by Matas: In the first three quarters of the nineteenth century the immediate mortality following ligature of the great vessels was 18.94 per cent; the mortality after extirpation, 11.32 per cent. During the aseptic period from 1885 to 1895 the mortality following ligature was 8.32 per cent, the mortality following extirpation, zero; but gangrene followed in 2.77 per cent of these cases of extirpation.

One sees, then, that up to most recent times, even, aneurism of the limbs was to be regarded as a most serious condition, while aneurism of the great internal arteries presented an almost hopeless problem.

Let us briefly record certain of the advances recently made, and let us note without undue complacency how

American surgeons have led the way in improving and rehabilitating this most ancient branch of surgery. We need not rehearse all the work accomplished in the surgery of the vascular system during the last decade; for Matas [1] reviewed it in a splendid monograph little more than a year ago; and let us observe a new phase in the development of vascular surgery, and note two or three names.

Throughout surgical history and down to our own time lesions of the arteries and veins have been treated by methods intended to destroy or eliminate the affected vessels, though surgeons have always known that small punctured wounds of veins, such as are made in blood letting, heal readily without special treatment.

Now we have learned that wounded or damaged arteries and veins may be sewed up, when they will unite as readily as will wounded intestines. Indeed, have we not seen the English surgeon Lambert, in the eighteenth century, restore a wounded artery by pin sutures?

Since 1895 Robert Abbé, J. B. Murphy, Rudolph Matas, and Alexis Carrel in this country, with their numerous followers and disciples, have shown that arteries may become dilated, may be incised, cut across, and removed in part; while the damage so inflicted may be repaired by direct suture, by end-to-end approximation, by implantation, by anastomosis, and by closure of the intima by suture from within (aneurismorrhaphy). We are concerned, however, with the

[1] "The Suture in the Surgery of the Vascular System," by Rudolph Matas; printed at Montgomery, Alabama, 1906.

bearing of all this upon the aneurism problem; and we point with proper pride and honest satisfaction to the accomplishments of Matas, whose work on aneurism is the first worthy of permanent record since the days of John Hunter.

Matas tells the story modestly. Here is the account of his first convincing case, on which he operated nineteen years ago; and he waited fourteen years before he advocated his method finally to the surgical world.

His patient was a young negro man, twenty-eight years old, the victim of a large traumatic aneurism of the brachial artery in the middle third of the arm. At two different sittings Matas performed the operation of Antyllus, modified; tying the brachial above, and then below the sac, but without avail. Pulsation in the aneurism returned on the tenth day after the second operation. He then decided on extirpation, cut down upon the aneurismal tumor, and opened the sac. He found the brachial artery to be fusiform and greatly dilated at the site of the injury, while the failure of his ligatures to control the vessel's pulsations was explained by the feeding of the sac through a number of dilated collateral branches from above. Unfortunately, or fortunately, the operator found that he could not proceed with extirpation of the aneurism without serious danger to the innervation of the arm. The sac was intimately adherent to surrounding structures, and the median and ulnar nerves were imbedded in its walls. Says Matas; "it instinctively occurred to me that the quickest way to secure a permanent hæmostasis, without endangering any important parts,

was by obliterating all the visible openings within the sac, by a continued suture." He obliterated them, using a silk suture, which closed completely the thick margins of the openings; and when he removed the tourniquet not a drop of blood escaped from the sutured orifices; the hæmostasis was complete. The wound healed promptly, and ten years later Matas saw the man in sound health. Pulsation in the radial artery had returned, and the patient was working at heavy labor as a plantation hand.

For twelve years Matas did not repeat this operation, though he had several opportunities to do so. In those years he turned back to the old-time methods because he shrank from employing his new and radical procedure in so grave a disease. But on two occasions the old methods failed him. Ligature and extirpation in his hands were followed by gangrene; and in one of the cases he was forced to amputate a thigh in order to save the patient's life. Nothing could be worse than that.

Beginning in 1900 he had a succession of cases in which he operated by his new method, — by suture of the aneurismal openings, and always successfully. In 1902 he reported his results. Other surgeons adopted his plan, until to-day nearly thirty cases have been reported, with this astonishing record: Immediate mortality, zero; percentage of subsequent gangrene, zero.

In this brief summary I may not discuss at length the details of Matas' method; but ask you to observe certain points, often misapprehended, misquoted, or ignored: —

The fundamental purpose in his scheme of operating in all cases is to close by suture all the arterial openings within the aneurism. Many writers have assumed that Matas plans a reconstruction of the artery out of the sac, in fusiform aneurism. He plans no such detail as part of his routine operation. He merely suggests such a step; but so far as I know he has as yet taken it in no case. That step is not necessary.

One asks, if Matas contemplates suture occlusion merely of all arteries opening into the aneurism, wherein does his method differ essentially from the method of Antyllus? It differs radically, and in this respect; — that Antyllus, by tying the main artery above and below the aneurism, left to chance the settlement of two important elements in the problem. In certain cases he ran the risk of cutting off by his ligatures small but essential collaterals, whose presence would safeguard against gangrene. On the other hand, he failed to eliminate those extra arterial feeders of the aneurism, those supernumeraries, which, as well as the main artery, pour blood into the sac. Moreover, a large aneurismal sac is closely adherent to surrounding structures; its walls are vascular, and carry often in their substance arterioles, veins, and nerves whose existence may be essential to the preservation of structure and function in the limb. We must not, therefore, remove the sac or any part of it. Matas explains how he folds it in upon itself and preserves it entire, as a crumpled but vital mass.

Thus all possible tissue of value is preserved, all harmful arterial streams are held in check, and every

vascular avenue, which may share in bearing needed supplies of blood, is encouraged to take up its vicarious duties.

Matas' studies and his operation for aneurism furnish our latest advances in this fascinating subject. In rough and fragmentary fashion we have traced the history of this disease through many centuries. Its pathology, its characteristics, its fatal outcome, its treatment, gradually have unfolded themselves. With it are associated the names of the greatest surgeons since surgical literature began; and now in this twentieth century we see a radical and perhaps a final stride forward made in the solution of the world-old problem.

PRESENT PROBLEMS — AN ADDRESS TO THE NURSES OF THE LAKESIDE HOSPITAL[1]

GOOD nurses are born for their work.

Poeta nascitur, non fit is as true of you as it is of the lawyers, doctors, ministers, and politicians. You can manufacture out of the most unpromising material a good engineer, or carpenter, or sailor, or even janitor; but when it comes to those persons whose work depends on their contact with other people, who deal in personal equations and not in impersonal figures — then there enters into the problem a new and wonderful group of elements which are a part of the birthright of some, while the others without them stagger through life, blind, puzzled, indignant with the fates: tact, humanness, womanliness, manliness, the appreciation of proportion, the attribute of sweet reasonableness, the rare sense of humor. And of course you are to take this reflection as meaning that some of us are better workmen than are others. To him that hath, is as true as ever it was, but we should have to despair indeed if we were to believe that from him that hath not shall be taken away even that which he hath.

You trained nurses have had your place in the world's work now for more than a generation, and it seems to me it is time to look about occasionally and ask what you have made of yourselves.

[1] Cleveland, Ohio, May 25, 1903.

I have heard and read many addresses given to nurses on such occasions as this, and in the main the speakers have devoted themselves to two topics — your usefulness and your education. Nurses have been told a thousand times that theirs is the noblest of professions; that nursing is woman's true sphere. Poets have been invoked to demonstrate that by day you comfort the sick, by night you soothe the dying. *Weeping willows* have been made to rhyme with *lonesome pillows*, and the rest of it.

It's all true enough. Nó one appreciates it all more than I do. It *is* a noble profession, and the good you do is beyond measure.

Then there is that other subject, — your education. That is a great subject. You have begun it well here in this training school, but the most important part is to come, and I want to talk with you in some fashion about that.

At the outset of your work in life after leaving the training school, you are in a position quite different from that of any other professional people known to me; you are equipped for practice and you assume at once the full standing of the experienced workman. You are deemed — for so tradition has arranged it for you — as competent as the women who have grown gray in harness. You expect as a right the maximum wage, — twenty-one or twenty-five dollars a week, or whatever the sum may be in your particular locality, — and as a general thing you get no less. Did it ever occur to you what that state of affairs may mean? Try to apply the same principle to other professions

or trades, if such a conception is possible. What would you say if you had to pay a young journeyman plumber or carpenter the same wages that you pay the master craftsman? How readily would you call in the youthful doctor or lawyer if his fees were those of the eminent specialist or jurist? The thought is inconceivable. But you will say there is no parallel in the two cases; the young nurse is equipped for her work as well or better than the old one. The nurse fresh from the hospital is likely to be better than the nurse grown stale. She is familiar with the latest methods; she knows the new drugs and the new instruments; she has served only with physicians who are leaders in their several departments; she is keener, more alert, more interested. All that is so true that it seems unanswerable, but if followed to its logical conclusion it means this, — that the younger the nurse, the better the nurse; the older the nurse, the worse the nurse. Is that a pleasant prospect? Is that creditable to a noble profession? The youngest nurse is best for the community, if you choose to put it so, but is that a condition best for the nurse herself? I have had old nurses — women with fifteen or twenty years' experience — come to me complaining bitterly that their practice was leaving them, that their old patients never sent for them, that the doctors no longer employed them. We have in Boston an institution called "A Home for Aged Women," part of the income of which is specifically devoted to helping women who have grown old in the care of the sick. That fund is called the Doane Fund, and I assure you the beneficiaries

under the Doane Fund are but a fraction of those needy ones who clamor for relief.

All this is a very serious business; it is not a cheerful topic to air before you as you start generously forth on your life work, yet it is a significant fact, and it must give pause to those of you who are wont seriously to consider the life problem.

When the trained nurse became an accepted fact twenty-five or thirty years ago, she was looked upon as an exponent of our modern altruism — as a secular sister of charity, so to say; but she was not taken seriously as a professional woman. Of course she had to live and she had to be paid. Nurses were few in number, and they were greatly needed. The cost of a nurse was fixed high, for it was a matter of supply and demand; but a nurse was a nurse, the laborer was thought worthy of his hire, and so from the outset the pay was good while work was to be had. But there was no progress for the individual.

There was no progress. It was there, and it is there, that the fatal weakness in the nurse's profession inheres. Of what other toilers in this busy world can the same be said? The chore boy may rise to be head waiter; the unskilled laborer may rise to be boss of the gang; the apprentice may become a foreman; the office boy may become a justice of the Supreme Court; the house officer may become a great surgeon. That is what life means to most of us. Work; steady unceasing, increasing work; with widening opportunities, with proportionate returns, with an honorable goal. Those are some of the things that make life

worth the living; and with them go other things which to some count for more even than material success — increased occasions for usefulness, a broadening horizon, a closer and more generous contact with our kind, a full career, and at the end the unspeakable satisfaction that we have not lived in vain.

I fear we are all of us very weak human beings. Few of us were born to be great, but that is no reason for curtailing our chances, and as yet it seems that the chances of nurses are not what they might be made.

My predecessors in this office have said some very stirring words about what nurses are and what they are to be — words stimulating and instructive. Those gentlemen have told how your education is to be broadened and how your place among the world's workers is to be made more honorable and more secure; but I cannot help feeling that those happy prophecies of theirs were addressed more to the nurses of the future than to you who here and now are taking up the task of caring for the sick.

I wish I had some ready, practical solution for the problem which I have suggested; some method by which you could become stronger and wiser, more learned, more skillful, and more in demand individually as the years pass; but the problem is one which cannot be answered offhand. It is one which you yourselves must solve, painfully, laboriously, by the slow process of evolution. I have some thoughts, however, which you may take for what they are worth — old thoughts many of them, futile perhaps in some sort, but occur-

ring not infrequently to those of us who have your welfare at heart.

In the first place let me tell you that unless your circumstances and training are very different from those of most of the nurses known to me, it is a mistake to start in as specialists. Such specializing may come later as your careers develop, but at the outset take everything that comes to you unless you feel yourselves unqualified. Don't pose as surgical nurses or medical nurses or obstetrical nurses, and, above all, don't refuse to nurse men. For a good while yet you will need all the experience you can get, and you can get it in general nursing only. Don't tie yourselves to one doctor. He may fail you, for he too is but mortal, and nurses may quickly be lost to view and hopelessly side tracked.

Don't refuse poor cases. I wish some fashion might be devised by which the poor could be effectively cared for in their homes. By the poor I do not mean the starving and the destitute. They are looked after by the hospitals and the district nursing associations, but I mean the families of men on small salaries. If the father earns forty or fifty or even one hundred dollars a month, he cannot well pay out twenty-one dollars a week for a nurse in addition to all the other heavy expenses which illness entails.

Such people get often the best of *medical* care, because competent young doctors will treat them for the sake of practice and old doctors from a high sense of the sacred obligation that rests upon their calling.

Don't mistake me! I am perfectly well aware that

nurses do take poor patients, but I think if you consult some of your older sisters and listen to some of their talk you will find that they often look upon such service as a hardship and feel that the good-natured charitable ones are imposed upon and lose caste even.

Remember that what I am saying is suggestive merely and is crudely sketched; but would it not be possible to establish traditions in your profession similar to the traditions of physicians, — that in some fashion no call for help should be refused? You are banding yourselves together into clubs and associations, and such banding is distinctly for your best interests as well as for the best interests of the community. In some way which should not interfere with the liberty of the individual would it not be possible for such associations to see to it that its younger members, without serious pecuniary loss, might give a portion of their time to the poor, and that the doctor, when asking for such help, might not have to approach you with an apology? To such suggestions as this, nurses have replied to me; "Very true, some nurses do take cases for small fees, but they soon come to be known as cheap nurses and lose their chances for the paying cases." Truly that is a lamentable fact and a lamentable tale. It does not count for better things that such is the case, and it rests with you in your organizations and in your public spirit to see to it that such things cease to be.

There is our first thought: that poorly paid, little regarded work be done, that thus the field for the work of all be widened and that out of such small

beginnings great reputations may be made. For mark me, this thing that I tell you is true: a professional reputation, whether of lawyer, doctor, or nurse, must rest on foundations broader than the flatterings and praises of a few wealthy clients or patients. Such thin reputations are erected in years and are shattered in days. None of us is safe who depends for work on the fickle fancies of the few. Gain the confidence of the whole community, of the poor and the rich, of the little doctors and the great ones — then you may rely upon an assured future.

You will tell me that this may all be true, but that it does not meet my earlier query: Is the young nurse the better nurse, the old nurse the worse nurse? There indeed is another problem. So far as "up-to-dateness" goes, perhaps in a superficial sense the young nurse may be the better; but the fault will be your own if that remains true in the future. Remember that I am speaking now of the great majority of your number — of those who go out into private practice. You must not allow yourselves to grow rusty and inefficient. Already in your school you have been taught to study and to use your minds and to do your own thinking. That is the best thing you have learned here. Having learned that, you must apply it ceaselessly. I need not insult your intelligence by telling you to keep up your reading. You must do more than that; you must cultivate continually the habit of observing, deducing, and recording — those three functions of the trained mind. The ward and the sick room are your laboratories, and with due regard

to the humanities you must take advantage of that fact.

Lately at the Massachusetts General Hospital, and at some other hospitals I believe, we have established ward courses for graduates. As yet those courses have attracted all too little attention; but nurses are beginning to appreciate their value, and before long I hope to see alumnæ returning in increasing numbers for such work.

As you progress, too, you will find, or you will make, various opportunities for reviewing and for supplementing your present knowledge. You will gravitate towards special lines of work in which you will be regarded as expert. For many of you whose temperaments so lead you, an occasional course in some hospital or other institution will appeal, and you will find such experience of advantage. I am not referring to those who propose devoting their lives to institutional work, but to the private practitioners among you. A summer spent every few years as operating assistant or substitute head ward-nurse will keep you in touch with the new things, for, indeed, new things come slowly in the active lives of most of us.

But, after all, the best and most important thing will be constant serious coöperation among yourselves for the betterment of your profession, and that co-operation, to accomplish its purpose, must be along democratic lines. It is all very well to have small clubs and cliques for social purposes and for special work, but when it comes to those organizations which really strengthen your profession and deepen its foun-

dations, you cannot afford to depart from the democratic idea. This I say from a considerable knowledge of how similar problems have been met and solved in my own profession. There is a democracy of science, and in a true sense you nurses are workers in the scientific field.

Last year Dr. Osler gave a delightful address to the Canadian doctors on what he called "Chauvinism in Medicine." He pointed out how we all, regularly educated and licensed practitioners, belong to one great family; how there are no school, city, state, or national boundary lines among those whose pursuit is the truth; how jealousy and local conceit and the decrying of those whose work lies without our little circle lead to narrowness, to self-stultifying, and to the destruction of that very edifice of science which the best among us are faithfully and laboriously building. The address was a fine plea for the brotherhood of science and of man; a plea which nurses as well as doctors might well listen to and heed. It is by a banding together of all the efficient in one great sisterhood that you can raise your profession to the stability of those other professions with which you must come to be ranked. I beg of you to note that word *efficient*. I am not asking you to open your ranks to the incompetent, the unscrupulous, the impudent, the charlatans untrained. You must steadfastly refuse them your countenance as you are doing; but you must recognize the efficient among yourselves — those who have proved their worth by years of work and the winning of recognized diplomas, no matter whence they come or what

their school. If you do not do this, if you do not so strengthen your own hands, you will continue to invite the competition of the pretenders, and you will be emulating the example of some of the labor unions, which destroy their own ends by encouraging a fatuous mediocrity.

I could specify easily examples of what I mean, and tell of certain groups of nurses, graduates of certain hospitals, who persistently look down with a silly and irritating jealousy upon those outside of their own little circle. Perhaps such conditions do not exist in this part of the world. I certainly hope they do not, but let the warning stand, nevertheless.

It will not be long, I believe, before a recognized and legalized sharp line of cleavage will be drawn between trained or registered nurses on the one hand and the masses of the untrained on the other. In the bill providing for the examination and registration of trained nurses, which is before the New York Assembly, Miss Palmer pointed out that in that state there were *twenty-five hundred trained* nurses and *fifteen thousand* untrained nurses. The bill is being introduced through the agency of the New York State Nurses' Association, and will prove a great step in advance. The other day, in Massachusetts, a similar organization was formed by some three hundred and fifty nurses, assembled in Faneuil Hall for that purpose. Many hospitals and schools throughout the state were represented. The same work is going on in other states. It is a very real and important work, I believe; and I do sincerely trust it will lay the founda-

tion for that catholicity of purpose, that broadening of horizon, that capacity for true progress, which must attach to every vocation that is to succeed.

There is another aspect of the nurse's problem which will be more immediately obvious to most of you than are any of those questions which I have raised; I mean the attitude towards you of the public and especially of individuals among your patients. The public has long since come to recognize vaguely your value and to turn to you for help, and the public approves of the trained nurse as an institution. But there are many people who persistently think ill and speak ill of the nurse as an individual. This sentiment rises usually, you will find, from some unfortunate or unpleasant experience with some special nurse. You will hear a foolish person say, "I don't believe in trained nurses," and he will say it to you with a smirk of self-approval. But you will just as often hear the same individual remark that he does not believe in doctors. When that sentiment has been addressed to me, I have always felt soothed and stimulated, glad that the world has produced one more person of tact and sensibility.

There is, however, a very considerable number of reflective men and women who will tell you that they do not regard nurses as professional persons at all. Their reasons are in part those I have already suggested in this address; but these critics feel, in addition, that most nurses in the nature of their circumstances, from the fact that they are young single women, do not look forward to nursing as their life

work. It is said that they take up nursing from a great variety of inadequate reasons — to kill time, to find new sensations, to make a little money, to become independent, and the like; but, that as a matter of fact, they do not intend to remain nurses; that they expect a more secure settlement and to become wives and home-makers like the rest of their sex. In all candor, we must admit that there is a great deal of truth in this, for such is the state of mind of many nurses. If the anticipated events occur, the nursing lives of many nurses are to be short ones. Now, as a matter of fact, the average nursing life is about ten years; and is not ten years of professional life something seriously to be regarded? The lawyer and the doctor have average professional lives of about twenty years; twice as long as the nurse's, but sooner or later the lawyer and the doctor leave the stage — they die, they grow old, they retire. Of what consequence is the reason? Where, then, are we to distinguish? The doctor dies, the nurse marries, if you choose. Is the career of the doctor, which lasts twenty years, to be applauded, and the career of the nurse, with her ten years, to be dismissed with flippant words?

But there are other more urgent hardships than this skeptical estimate in store for you — so you will be told with much truth. The great and standing grievance which very many nurses come to cherish against their patients and their patients' friends is a lack of consideration. Many persons employ a nurse not for her knowledge, experience, and skill, — those things they are apt to question, — but in order to spare them-

selves. To them a trained nurse is a human machine to be secured, wound and ready to go indefinitely. Such persons will not spare *you*. They will keep you busy day and night. It is such treatment, which I regret to say is all too common, that helps to breed in nurses a sense of antagonism, a certain hardness, and brings about that state of mind which thinks of and refers to patients as *cases* and not as afflicted human beings. Perhaps, too, the doctors are in a measure responsible for this attitude of nurses, because, as your training in the hospitals shows you, the doctors, with their press of work, unavoidably regard their ward patients as cases and as material. Of course, that is a mental attitude deplorable alike for doctors and nurses. The doctors, with their wider experience and more diversified lives, are able mostly to subdue the tendency at will. For you it may be somewhat more difficult, but it is a task to be done.

Another remedy for this tendency, perhaps the most important remedy for you as your lives develop, is to seek the special line of work that you do best. At present there are three broad classes among nurses, each class having its subdivisions. The three classes are: private nurses, institutional nurses, and district nurses. Their three lines of work are quite distinct, each having its particular interests, suited to different temperaments. I think I should choose to be a district nurse if I were a nurse. The private nurse earns more money; the institution nurse sees a greater variety of practice and has regular hours; the district nurse has greater independence and comes into the

closest contact with humanity. So let each one choose.

Such, briefly, are some of the problems which must be met and solved by nurses and nurses' associations. I fear I may not have told you very much that is going to be of immediate practical value, but how is that to be done in a fifteen minutes' talk at the end of a three years' course?

The question is often asked, What is the one thing most essential for a nurse's success? The answers are as various as the questioners: good health — yes, that is essential; cleverness — you can get on without too much of that; good temper, tact, courtesy, gentleness, courage, interest, fidelity, unselfishness, — all those are fine useful traits; if you have them not, perhaps you can cultivate them. Sometimes I have thought that the attitude of the Sister of Charity is the best thing a nurse can attain, that self-effacement, that thought only for the patient which those good women are supposed to have. To this some nurse will answer: Yes, but we are taught to consider the doctor first and the patient second.

Truly, it is a thorny path, to be sought and followed by each individual according to her best lights and endeavors, and when you argue it all out to the last analysis, why is it not true that the great essential for success in nursing is the same as for success in the other walks of life? Saneness, a sound philosophy, a clear-eyed outlook on the world as it is — there is nothing new in that thought. Socrates, Epictetus, St. Paul, and Marcus Aurelius held this view.

While you work preserve your health; find recreation, physical and mental. Don't forget how to play, but play in season. If the patient overworks you, tell the doctor you need help. Get an hour or two of exercise in the fresh air every day; get six to eight hours of sleep out of the twenty-four; eat three regular meals and eat them slowly. Faithfully keep up the routine of cold bathing as you do the wearing of fresh linen. Keep your mind alert and interested; know things outside of your profession; cultivate a hobby. That eminent lawyer and writer John C. Ropes once told me that it was necessary for every successful professional man to have some constant outside pursuit. His own hobby was Napoleon and matters pertaining to military history. During his later years I suppose he knew more about Napoleon than did any other living man. His hobby kept him fresh, eager, interested, and supremely interesting. You women can have your hobbies, whether you take to Napoleana or the D. A. R., to botany, painting, embroidery, stamp collecting, astronomy, or wood carving. All such things are honest, instructive, wholesome, and they count for good.

And mark you this, that as you broaden yourselves you acquire more of that true sense of humor which is a large part of the philosophy of life. As the years pass, it makes that life more abundantly worth the living, "for truly, this humor is an adjunct divine, and as far beyond the trivial word for it as 'love' is or 'charity.' No definition or happy phrase sums it correctly or rates it high enough. It is a balm of life. It

makes for greater things than clean laughter from the lungs. It is the root of tolerance, the prop of patience. It suffers long and is kind; serves to tune each little life harmony with the world harmony about it; keeps the heart of man sweet, his soul modest; and at the end when the light thickens and the mesh grows tight, humor can share the suffering vigils of the sleepless, can soften pain, can brighten the ashy road to death." [1]

This is not a sermon. It is not even a lecture, but a plain talk by a working man to working women, and remember, as the Cambridge poet said two hundred years ago —

"A woman's work, grave sirs, is never done." [2]

[1] Eden Phillpotts, in "Sons of the Morning," page 479.
[2] Mr. Eusden, at the Cambridge Commencement, 1714.

THE NURSE'S VOCATION[1]

ALL of us are born originals; most of us end imitations. That is a fact as true of nurses as of all the rest; and I am not sure but what a fair copy is better than a poor original, when it comes to the question of nurses.

The master word for you is service, just as service should be the master word for other decent Christians; but it is the nurse's function even more than the doctor's, or the lawyer's, or the house maid's, or the janitor's, to be a decent Christian. If we lack that sense of service, we are but as sounding brass or a tinkling cymbal. Frankly, I know of no vocation which demands higher training in morals and in ethics than does yours, — a comforting assertion, doubtless, for those who are graduating and about to take up their work.

Let me spend a few minutes in attempting to illustrate what I mean. Let me tell you about nurses as I see some of them, and then tell you something about nurses as I fain *would* see some of them.

I will admit at once and in all humility that other folks as well as nurses are not perfect. Perhaps I know as many perfect nurses as perfect doctors or perfect clergymen; but the positions and the strivings

[1] An address delivered before the graduating class of the Lowell General Hospital, June 21, 1905.

of doctors and clergymen are an old story, — long ago defined by Hippocrates and by St. Paul. There has as yet arisen no prophet of nurses, so far as I know. Doctors and clergymen are striving with more or less feebleness to live up to ideals. What are the nurse's ideals and how is she living up to them?

To gain a proper understanding of your position, you should have some knowledge of the history of nursing. The much-abused, rather mythical, old-fashioned nurse is more or less known to you, but even the old-fashioned nurse had her virtues. Often she was a Sister of Charity; sometimes she was a kindly neighbor; and frequently, of course, she was a paid servant. On the other hand, she was ignorant of many things; she lacked discipline; she was a tattler and busybody, perhaps; she had crude notions of loyalty; sometimes she was a thorn in the flesh. But take her all in all, she was a very normal creature, — humane, sympathetic, zealous, given at times to the shedding of tears. Ivanhoe's Rebecca was the goddess of old-time nurses; Sarah Gamp was the head devil.

Now it came to pass as the art of medicine advanced and as physicians and surgeons developed accuracy of method that they found their untrained nurses largely ineffective. Often they did not know, but dangerously feigned knowledge, — that common vice of the ignorant; often they adopted measures of their own, at variance with their instructions; sometimes they told fibs. From time to time rough attempts at reform were instituted. The great hospitals of Europe and some in this country gave thought to the nursing

problem, and kept wise women in their employ, but those women were of small service to the community. Rarely some doctor would find a jewel to his hand, like Dr. Goodenough's Little Sister of whom you read in Thackeray's "Philip."

Then came Florence Nightingale. Now Florence Nightingale is one of the great ones of this earth. She is a gentlewoman; cultivated in many things; wise, with a vast *love* of her kind. She has that quality, and without it service is impossible. To her those beautiful words of Thomas à Kempis are true and always present: "Love watcheth, and, sleeping, slumbereth not. When weary it is not tired; when straitened it is not constrained; when frightened it is not disturbed; but like a vivid flame and a burning torch it mounteth upwards and securely passeth through all. Whosoever loveth knoweth the cry of this voice." I said you have no prophet, but always you have Florence Nightingale; and since her coming the world has been a better place in which to live. She set a standard, and slowly the news drifted to these shores. While she was still young our own Civil War came, — when good women, by the hundred, took up the care of the sick. A great deal of that was crude work, if you choose, but a new spirit was in it, and the much-talked-of emancipation of women had its share in developing a new ideal. Here, surely, was a task for which women were fit. Quickly and from many quarters there grew up a widespread feeling that in the care of the sick was a great opportunity for a brilliant career; that the old ineffectives must be abolished. The medical pro-

fession was earnest for the plan, the more intelligent of the community at large demanded it, now they had had a glimpse of better things. Of course, there were some people who regarded the idea as Utopian. They did not believe that educated, broadly cultivated women could be secured in numbers sufficient to build up this great ideal lay-sisterhood. They pointed out that the work would fall into the hands of time-servers, and that, at best, we should have developed educated machines merely. Enthusiasts for the new movement held a different view. They dreamed dreams and saw beautiful visions; they imagined a great body of educated, devoted, and self-effacing women, forsaking father and mother, and going through the world shedding light in dark places, given to good works, tactful, patient, long-suffering, turning the other cheek also, soothing the sick, comforting the dying. These were pleasant and refreshing thoughts. It is with no cynical intent that I quote them, doubtless they are more or less familiar to all of you. Doubtless with such thoughts in mind many of you adopted this calling.

Accordingly, it came about some thirty years ago that a great concerted effort properly to equip nurses was developed through the establishment of Training Schools for Nurses in connection with Bellevue Hospital in New York and the Massachusetts General Hospital in Boston. Promptly, similar schools were started in other hospitals. In the early days the training was different from what we see to-day. The nurses served for one year, or at the most for two years. The leading thought in their education seems to have been

discipline, subordination, loyalty, learning faithfully to perform a lieutenant's work. They were taught a systematic routine, the careful observation of conditions, the meaning of symptoms, the accurate carrying out of orders, the noting things in books, — indeed a great part of their time was occupied in noting things. Then nurses began to be graduated, and slowly the community came to recognize the new order. Then at once a strange and unexpected thing happened. The community for several thousand years had been accustomed to its untrained nurses of the gossipy, serving-maid type; suddenly the community found that here was a novelty, — a class of self-respecting, independent, forceful, and somewhat high-handed women to whom the afflicted ones must be obedient. The situation did not lack elements of the comic. The community gasped, and promptly the gossips and the sewing circles divided themselves into two camps, — those who believed in trained nurses, and those who did not believe. Scattered fragments of those camps may be discovered still by the curious.

It was a difficult position for the first of those trained nurses. The situation was anomalous, and in many ways confusing. In the hospitals they had been educated for subordination and service; outside of the hospitals they found themselves in positions of authority and more or less of independence. In the hospitals they had been accustomed to look up to their staff teachers as wise and almost infallible, and to look down upon the patients as instruments and material. In private practice the positions were reversed.

The nurses found themselves often serving under physicians whose methods were strange to them, whose wisdom they doubted, whose abilities they sometimes despised; while the patient and his family were made to appear often as the source of authority. Such a situation was full of perplexity. It was a situation of which you may still catch occasional glimpses, and the success of the new venture rested upon the proper handling of this situation by doctors and nurses.

So there grew up two attitudes of mind among the employers of trained nurses, and these crystallized more or less into the formation of two parties. There were those who held that the trained nurse should continue to be little more than an inferior attendant of the old-fashioned type, — that thus alone could the situation be made tolerable; while, on the other hand, there were those who held that the nurse's training was as yet far from perfect and that salvation rested only in the evolution of a nurse of the highest character and attainments.

We all know that the world does not often move backwards; accordingly, in the evolution of nurses it was not surprising to see the party of high ideals obtaining the ascendant. Glancing back over the last twenty years, what do we see? The class of women who have taken up the vocation of nursing gradually have become a superior class. Women of some reasonable equipment in education only are being admitted to the schools. The length of the school courses has been increased; the probationary months have been made more vital; the variety of subjects studied has

been multiplied; instruction in special differentiated branches has been instituted; the subsequent careers of nurses have been anticipated somewhat, so that an acquaintance with what private practice means has been taught. Many nurses before graduation know in some fashion the difference between the rich and the poor; they learn to serve with little help; they learn the limits of their own resources; they come to appreciate the line in which they may be effective.

Further, in the development of the guild of nurses a great variety of minds have taken part. It became apparent long ago that ideal nurses for particular communities are not always to be found in the great municipal hospitals, with their machine-like routine and enormous press of work. The managers of hospitals, great and small, public and private, came to see that it is for their advantage to train their own nurses, and each one of these hospitals has developed its individuality. It is scarcely in place for me here to discuss the special advantages of the small and the great hospitals; but I can assert this, that many of the most efficient, the most humane, and the most satisfactory nurses with whom I have had to deal are women whose natural development has not been stunted by the routine of *great* hospitals.

Just what the course of your training here may be I do not know, but constantly I have been impressed with the advantage it is to a nurse to have found her experience in private practice while still an undergraduate and in the course of her instruction at the hospital.

The debate over a proper training for nurses goes on still, and even for you, perhaps, it has become a weariness to the flesh. Yet it all hinges, I believe, upon the conditions which hedge you about. It depends upon your purpose in life. On a previous occasion I referred to this question in some such words as these: at the outset of your work in life, after leaving the training school, you are in a position quite different from that of any other professional people known to me: you are equipped for practice and you assume at once the full standing of the experienced workman. You are deemed — for so tradition has arranged it for you — as competent as the women who have grown gray in harness. You expect as a right the maximum wage, — twenty-one or twenty-five dollars a week, or whatever the sum may be in your locality, — and as a general thing you get no less. Did it ever occur to you what that state of affairs may mean? Try to apply the same principle to other professions or trades, if such a conception is possible. What would you say if you had to pay a young journeyman plumber or carpenter the same wages that you pay the master craftsman? How readily would you call in the youthful doctor or lawyer if his fees were those of the eminent specialist or jurist? The thought is inconceivable. But you will say there is no parallel in the two cases; the young nurse is equipped for her work as well or better than the nurse grown stale. She is familiar with the latest methods; she knows the new drugs and the new instruments; she has served physicians only who are leaders in their several departments;

she is keener, more alert, more interested. All that is so true that it seems unanswerable, but followed to its logical conclusion it means this: that the younger the nurse, the better the nurse; the older the nurse, the worse the nurse. Is that a pleasant prospect? Is that creditable to a noble profession? The youngest nurse is best for the community, if you choose to put it so, but is that a condition best for the nurse herself? I have had old nurses — women with fifteen or twenty years' experience — come to me complaining bitterly that their practice was leaving them, that the doctors no longer employed them.

All this is a very serious business; it is not a cheerful topic to air before you as you start generously forth on your life work, yet it is a very significant fact, and it must give pause to those of you who are wont seriously to consider the life problem.

When the trained nurse became an accepted fact thirty years ago, she was looked upon as an exponent of our modern altruism, — as a secular sister of charity, so to say; but she was not taken seriously as a professional woman. Of course she had to live and she had to be paid. Nurses were few in number, and they were greatly needed. The cost of a nurse was fixed high, for it was a matter of supply and demand; but a nurse was a nurse, the laborer was thought worthy of his hire, and so from the outset the pay was good while work was to be had. But there was no progress for the individual.

There was no progress. It was there, and it is there, that the fatal weakness in the nurse's profession inheres.

Of what other toilers in this busy world can the same be said? The chore boy may rise to be head waiter; the unskilled laborer may rise to be boss of the gang; the apprentice may become a foreman; the office boy may become a justice of the Supreme Court; the house officer may become a great surgeon. That is what life means to most of us. Work; steady, unceasing, increasing work; with widening opportunities, with proportionate returns, with an honorable goal. Those are some of the things that make life worth the living; and with them go other things which to some count for more even than material success — increased occasions for usefulness, a broadening horizon, a closer and more generous contact with our kind, a full career, and at the end the unspeakable satisfaction that we have not lived in vain.

To some such situation as I have described have we come in the course of our development. Let us ask ourselves if we are satisfied with the situation, and if not, what we are doing about it. For those who have taken up this work as a means of living merely, do not the conditions, as they exist, lead to relaxation, to loss of perspective, to the leaving of well enough alone? And for the not rare ones of high ambition, is there never a sense of futility, if there be not mingled with that ambition a constant recognition of service? For the nurse wage-worker there must come a period when duty palls. There may come slack years and hard times and physical weariness and even loathing of the task in hand. For others of high courage there may come the period, with ambition unattained, when

all in sight has been achieved, and nothing appears beyond.

Such experiences are common to nurses in general practice. Similar experiences are familiar to members of my own profession, but mark the distinction; — for a truly superior physician there should be no limit to the possibilities of the future, in reputation, in achievement, in fortune. For the nurse, the limit is sharply drawn. She may always be busy, she may have a patient every day in the year, but never can she look beyond the round of caring for the individual, and passing monotonously from case to case.

How then may the nurse find satisfaction in her lot? Frankly, there is but one way, — the old way of which some weary in the telling, — in the sense of service. It is not a brilliant or glowing prize, — that service, — it is not a theme dear to the novelist, whatever it may be to the poet. But it is the one thing. If you have not that sense of service, or if you fail to grasp it as time develops; if after two or three years you are not doing your daily task from love of the work and from love of your kind, — then drop it, give it up, seek some other field; you will never be happy in nursing; don't go on with it unless you love it as your own soul.

If you love it, though, and if you are fitted for it, you will find in it a fascination that never fades, a variety that never fails, a horizon that never shrinks.

What then may be the career of the ideal nurse? of what is that career capable? That is the second thought in my theme, and it is a thought which has

puzzled wise men and women. Truly no life is so humdrum that it may not contain elements of tragedy; no career is so obscure that genius may not make of it romance.

I have known many nurses in the past twenty years; I have had much to do with their training and duties, and have watched more than one noble career. Let me tell you the story of such a modern woman: In my student days I went once with a well-known surgeon to assist him in an operation on a poor fellow living in a town near Boston. The patient was a clergyman who had prospered in his little world. He was loved by his people, and he had the proverbial clergyman's family, — a wife and five daughters. We met them all on that occasion, and they were an unhappy company of women. The eldest daughter was twenty-two years old. The father of the family was in the third day of a fulminating appendicitis, and I need not tell *you* what that means. The hope for him was scarcely a forlorn hope, but such as it was, my chief felt it his duty to seize on that straw; so he operated. There was no nurse to be had, — nurses were not common then in small towns, — but the eldest daughter asked if she might assist. She was a strong, sensitive, sane girl. She did what she was told, she was constantly on hand when needed, and she held her peace. Of course it was a shocking experience for the poor thing, but we saved her so far as we could. She stood to her guns through the operation; she tended the suffering patient all that night, she comforted her stricken mother, she soothed her frightened sisters, and she

was at her post with perfect courage in the early morning when her father died.

Some years later I met Miss Palfrey, let us call her, in the wards of a hospital, and heard something of her story. After her father's death the family had been able to keep together; then two of her sisters had married, while she herself had completed a college course. But she had never forgotten the operation on her father and had taken up the vocation of nursing.

There was nothing remarkable about her hospital career, except that she read aloud well to patients, as I learned incidentally, — that almost lost accomplishment of good reading, — and her cases needed less morphia than those of others, after operation. She was not particularly brilliant and took moderate rank only at her graduation. On leaving the hospital she went at once into district nursing, and there her reputation was made, — it was made within a year. I have no intention of telling a pathetic tale; a pathetic tale could be woven out of the experience of any nurse. There was the usual struggle, of course, with squalor, ignorance, and vice; the fight for neglected children, for overworked sickly mothers, for lonely consumptive men. But soon it became apparent to the doctors with whom she worked and to the society which employed her that here was a woman of rare judgment, tact, discretion, and capacity; with a power such as they had seldom seen for managing and uplifting those poor people. She could project herself into the lives of unfortunates, so as to get their point of view; she made their interests hers; she gave of herself, but with

proper reserve; and she did not break down. She kept her appointments, she carried out her orders. Her patients came to see the reasonableness of what she did. She organized classes of instruction, and became the center of a little competitive school of well-doing. Child-mothers saw the reason for not feeding their charges out of long-tubed bottles; tired women learned to appreciate that beer and popcorn are not invalids' diet; surly men took off their boots in the sick room and removed their hats in her presence. The District Visitor said that Miss Palfrey's ward was the least unruly in town, and the District Physician boasted his treasure of a nurse. With all that she was no prig. She was very human, and enjoyed her cakes and ale as much as the rest of us. She was and is an interesting woman. To be truly interesting you must have interests, but you must not let your interests rule you. This woman developed a wide-grasping mind. The thing immediately in hand and the meaning of life were clearly apparent to her, but she did not acquire hardness, or intolerance for soft and pleasant things. She did not hold the prosperous accountable for all the misery in the world; nor did she come to despise the poor as contemptible because ineffective. She took time to read; she went to the theater and she interested herself in politics and the useful movements of the day. She became a sort of Peter Stirling among women; and there she is to-day, a wise, devoted, and inspiring guide both for those who need and for those who would give help.

That is a life worth the living, it seems to me. There

is little pathos about the story and there is no humbug. It is all straightforward, sane, stimulating, and supremely useful.

I might weary you for another hour with platitudes and advice. I might tell of tact — that rarely curious, elusive quality, which we all think we have. I might recommend cheerfulness, self-restraint, sympathy, long-suffering, loyalty, repression, and a silent tongue. But of what avail? By this time you have these things or you have them not, in spite of my say-so. And there is that rare sense of humor of which I must quote to you again: "No definition or happy phrase sums it correctly or rates it high enough. It is a balm of life. It makes for greater things than clean laughter from the lungs. It is the root of tolerance, the prop of patience. It suffers long and is kind; serves to tune each little life-harmony with the world-harmony about it, keeps the heart of man sweet, his soul modest; and at the end, when the light thickens and the mesh grows tight, humor can share the suffering vigils of the sleepless, can soften pain, can brighten the ashy road to death."

So I have told you of what nurses were, of what some nurses are, and of what many nurses may be. Take my words for what you shall think them worth, whether you are originals or copies; but credit me, whatever your careers, whatever your special lines, whatever your health or your fortunes, all will be as ashes between the teeth, unless you set apart and cling to that master word, — Service.

HISTORY AND ETHICS IN MEDICINE[1]

"Why, all the Saints and Sages who discuss'd
Of the Two Worlds so wisely, — they are thrust
Like foolish prophets forth; their words to scorn
Are scattered, and their Mouths are stopt with Dust."

RULES to govern the practice of medicine began with the priests of Isis, centuries before our era, and the selfish guilds of that time were able to enjoin that healers of the sick must become part of their fold, or must cease to cumber the earth. Priestcraft was a function of government, and arrogated to itself the care of diseased bodies as well as of diseased minds.

In those days there was government supervision of practice in a sense which modern thought abhors. Such control was possible under an absolute monarchy only, in which the ruler was regarded as almost divine; but, when wars and tumults, and foreign invasion and revolution came, the old close medical corporation was broken up, and competition entered in. A class of physicians who were not priests grew up, — a class whom the law ceased to protect. They could no longer persecute and destroy their unlicensed rivals, so they betook themselves to ethics.

Egypt was not the only land which knew such changes. Throughout the ancient and mediæval worlds

[1] An address at the annual dinner of the New Bedford Medical Society, February 25, 1907.

fluctuations in custom occurred; at times there was a control of practice by statute, — civil or ecclesiastical; at times there was chaos, with such little decency as good ethics might enjoin and enforce.

I think that is an interesting reflection, and it is interesting also to recall that in those countries which have been the most enlightened, which have been most democratic in their customs and mode of thought, — in just such countries have superstition and vapid medical tradition and routine languished, while advanced liberal thought has flourished, science has progressed, quackery and falsehood have made the least progress, mild laws have sufficed, and ethics have triumphed. Such were the conditions in the Greece of the fourth century B.C., when the great Hippocrates lived. Hippocrates and his associates were the first to see clearly and to formulate the relations which should exist between physicians, and between physicians and patients; and so to Hippocrates we owe that famous oath, — the bond to which all right thinking doctors have ever since subscribed: —

"I swear . . . to follow that system of regimen which I consider for the benefit of my patients; . . . I will give no deadly medicine; . . . I will not produce an abortion; with purity I will pass my life and practice my art; . . . I will enter a house for the benefit of the sick only. . . . Whatever I hear and see in the life of men, which ought not to be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret."

There is a feeble and fatuous word, *etiquette*, by which

the unthinking are wont to cloak the noble qualities of *ethics*. Alas! that such a Turveydrop semblance should have been given a precedence by feeble minds; that the outward and visible sign should have shouldered aside the inward and spiritual grace.

Ethics signified originally *character*. It deals philosophically with conditions which affect the human family for good or ill. Etiquette codifies the superficial relations which govern men in the drawing-room or the club. Ethics directs that there shall be honor among gentlemen; etiquette that they shall tread softly and wear evening dress. Hippocrates marked the distinction. That great man struck at the root of the matter, and, like St. Paul himself, gave us rules that shall prove sound through all time.

So one sees, in looking back over the history of our guild, that after the banishing of privilege, and royal and priestly authority with their selfish pompous insistence and their tedious etiquette, there grew up gradually in the minds of thinking men a wiser appreciation of our purposes and a sound system of ethics.

Good ethics, then, is to be looked for among physicians who, following the teaching of Hippocrates and Aristotle, of Celsus and of Galen, maintain that he is the upright scientist who pursues his art by the light of sound reason; who draws his conclusions and guides his practice by deductions founded on accurate observation; who observes that clear inductive method which is older than history. Now, throughout its history, one sees that medicine has never been regarded as an exact science. Hippocrates himself founded his path-

ology upon a hypothesis, which developed into that curious myth known to us as the humoral theory; and from his day to our own hypotheses have abounded. The master knot of human life and human fate held firm through the ages. The great mystery of life remained a mystery. Men strove, by theories and systems, to unravel it, and while they sought the unattainable through metaphysical means, they continued blind to the solution of the attainable. While they sought by specious arguments to explain the destiny of the soul, they overlooked the heart's part in the circulation, and the liver's function in producing bile. So schools arose out of little knowledge. The leaders of those schools were honest men, but having dim light and having builded upon the sand largely, their superstructures tottered betimes, and their wisdom became as vapor.

Through it all, though, and with the progress of time, one recognizes the gradual accumulation of facts. Solid surgical knowledge existed among the Egyptians, Jews, and Greeks. Galen perceived something of the nature of the blood current and the function of nerves. The Arabians Albucasis and Avicenna, and the schools of Mediæval Italy, gathered up the wisdom of the ages, until, with the revival of learning in the 15th and 16th centuries, there came a rush and an enthusiasm for science such as had been unknown for a millennium.

But among the best even of those young 15th century moderns, certain ancient prejudices survived. Though Vesalius placed anatomy again upon a sound basis, and made possible a sane physiology, he despised

Paracelsus as a vain fool, and fell out with his own successor. The researches of Borelli and Malpighi and Harvey advanced our knowledge of digestion and of the structure of organs and of the course of the blood, but their very researches led those great souls to a contempt for chemistry and a vociferous decrying of those mysterious reactions whose principles the early chemists themselves ascribed to unexplained and supernatural forces. So there were materialists on the one side and mystics on the other; while out of the two types of mind there grew up two great schools of medicine which divided scientists for generations, — the iatro-physicists and the iatro-chemists.

Such dissensions among the wise conduced little to the winning for physicians of popular confidence and respect; and the literature of generations abounds in sneers at the doctors and flings at their pretensions. Hudibras and Don Quixote set the pace, and those immortal works of Butler and Cervantes for centuries imposed a standard of scorn from which the writings of our own day are not exempt.

Such lack of comprehension and sympathy appear constantly throughout the medical history of the sixteenth, seventeenth, and eighteenth centuries. Scientists had no common meeting ground or point of departure. They attacked from the circumference the great central problem of pathology; and while they worked laboriously and unwittingly towards a common center they bemired each other with bad language, and looked upon their rivals as knaves. Such were the scientists, — the few and lonely pioneers. But the great mass

of practitioners were the satisfied and pompous conservatives who were content with tradition, with their own misapprehensions of Galen's teaching, and with a monstrous therapeutics. While they upheld a dull and illiberal routine they hated bitterly the rare prophets of progress. So one sees two clearly defined groups among our professional forebears — the routinists and the liberals; the routinists forming a great and strong conservative body, the liberals divided among themselves, despising conservatives and hating those of their enlightened fellows whose lines of thought diverged from their own. History abounds in tales of these ancient squabbles. Conservative Sylvius attacked Vesalius because Vesalius taught a new and correct anatomy. Gourmélen, dean of the Paris faculty, attacked Paré, because Paré taught a simplified treatment of wounds. The whole French Academy derided Harvey because Harvey demonstrated correctly the functions of the heart; and in the enlightened eighteenth century, even, Pott inveighed against Hunter's operation for aneurism, while Sir Joseph Banks, president of the Royal Society, after Hunter's death asserted that the great Hunterian collection was of little or no value to the subject of natural history. While such were the views of many conservative minds, the conservatives themselves, though agreeing in their general attitude of letting well enough alone, constantly were embroiled over matters of procedure and technical rights of practice. Barber-surgeons encroached upon the field of surgeons, and surgeons encroached upon the preserves of physicians. Bonesetters pro-

claimed the ignorance of the faculty in general, and lithotomists attempted to show that they alone were competent to cut for stone.

Out of such a chaos of complacency and fever, smugness and contempt, ignorance and wisdom, perversity and enlightenment, backsliding and progress, men attempted in some fashion to apply the ethics of Hippocrates; but by their endeavors they succeeded in building up a thin system of etiquette only. With their limited knowledge and their lack of true comprehension they failed to perceive the common purpose which instigated all, — the purpose to mend and save human life and to advance their art. So ethics floundered and etiquette triumphed. One reads dreary accounts of dull formalities, of precedence, of bowing and wavings, of bed-side hemmings and hawings, of solemn groanings and fatuous consultings, of absurd stalkings; of prescribed costumes, of ruffles, wigs, shorts, and canes; of offense easily given; of slander, of rival schools, and of pretension founded upon academic degrees and illustrated by preposterous doses and the activities of the undertaker.

Towards the end of the eighteenth century, the humoral theory declined; the iatro-physicists and the iatro-chemists kept up a feeble wrangle; on the Continent of Europe a dozen diverse methods of practice sprang up and withered; in Scotland and England, Cullen preached an impossible new nosology; the Brunonian system imposed upon the credulous; and in our own America, even, Rush was asserting the triumphs of his own system, that "consumption in its

last stage is cured by bleedings; gout is torn from its ancient sanctuary; dropsy is cured; tetanus is prevented by inflaming the parts; madness has yielded to bleeding, low diet, and mercury; and the last achievement of our science consists in the discovery and observation of the premonitory signs of mortal disease, and in subduing them by simple remedies in their forming state." [1]

We talk about ethics and etiquette and how they languish. In 1778, Hunter told his students that he'd be damned if he would meet a brother practitioner in consultation; he is said to have claimed a fee which should have gone to a consulting colleague, and he clamored for all the money paid into St. George's Hospital by student assistants, because he said the young men were attracted there by himself alone. Medical gentlemen of those times thought poorly of John Hunter's etiquette, though no one questioned his ethics; but ethics were not understood then as we understand them now.

Behind it all, however, there was growing up in the eighteenth century a system founded upon the few and scattered sound teachings of earlier centuries; and an appreciation of science was coming to enlighten some of the better minds. John Locke understood science as we do. So perhaps did Sydenham and Boerhaave; so did Morgagni; so certainly did von Haller and John Hunter. Those brave men disregarded schools. They were practical observers, physiologists, pathologists, and surgeons; they looked for

[1] "Rush's Medical Inquiries and Observations," vol. 4, p. 393.

tangible proofs; they cared nothing for metaphysics and theories founded upon moonshine. Of them all Boerhaave and John Hunter affected especially American medicine in our early days, and Hunter's pupils, Physick, J. C. Warren, and their like, taught their students on sound and liberal lines.

In the last year of our American Revolution, the Massachusetts Medical Society was founded, with its leading object the promotion of medical education, war against quackery, the stimulation of preventive medicine, and the preservation of the public health. The annals of this famous society show that in the first fifty years of its existence it accomplished much on these lines of endeavor; that with the coöperation of Harvard College it did promote a higher grade of education; that its committees investigated and battled with serious and widespread epidemics, and that especially it had a keen scent for medical heresies of all sorts; that it strove vigorously to root them out and that its combat was unceasing. The development of homœopathy is one evidence of the chaos into which medical practice had drifted toward the end of the eighteenth century. As one examines it in the light of history, its early tenets seem but little more astounding than do those of the schools championed by Cullen, Brown, or Rush. Doubtless the early successes of homœopathy were the more striking because its let-alone principles contrasted so violently with the heroic measures of its rivals.

With such a sketch before us of former conditions we can see why etiquette became the greatest good, and why true ethics failed of general comprehension.

The warring schools of practice adopted their own rules and their own customs. Rival schools to them were anathema.

With the development of latter-day science, with the spread of a broad education, with the rise of special learning, and with the demonstration of a sound pathology and physiology as the central theme upon which rests our whole superstructure, it has resulted that ethics has come into its own, and that mere etiquette is but little regarded. Schools of practice no longer signify. Cullen, Brown, and Rush are forgotten. In some distorted fashion Hahnemann is thought to survive as the prophet of a simplified therapeutics, though few of his modern followers accept his premises. The great and fundamental distinction between latter-day and former medicine is our present sound conception of pathology. Modern practice rests upon a pathology of which the principles are everywhere accepted. Ancient practice rested upon a cloud-bank of whimsies, regarding the nature of which no two men agreed. Such division as still persists among educated physicians concerns the details of a dwindling therapeutics. A better understanding of each other, a wider knowledge, a culture founded on travel and observation in many lands, surely are bringing together all groups of thoughtful men in our profession. Etiquette is no longer imposed; it is the accepted habit of good breeding among educated men of science. Good ethics remains and its meaning daily grows more apparent.

Let us hope that that Chauvinism, of which Osler complained, one day will pass from us. We are not

yet perfect, however. Is it not worth while occasionally to return upon ourselves with the old question, Are we always and truly scientific in our modes of thought? Are we ready and willing, as were the early members of the Massachusetts Medical Society, to investigate with open mind new and strange things? Do we break through in season the shackles of convention? Or does tired cynicism sometimes prompt us to a denial of truths which seem evident to our more generous fellows?

Educated physicians are weary of old-time, meaningless terms applied to modern conditions. We hear still of *schools* of medicine, — the *old school*, *the new school*, *rival schools*. The educated man knows that the study and pursuit of science does not admit of schools. Doubtless, all methods of treatment and therapeutic activity allow many diseases to run their course with the recovery of the patient. Doubtless different therapeutic measures appeal especially to patients of different temperaments. Doubtless, in a great many diseases, therapeutic eccentricity and voluble verbiage do no special harm. Such reflections are familiar to us all, and we recognize the truths of psychic influence expressed by such conceptions. We know, however, that genuine organic disorders require for their cure something more than empty phrases and placebos, while the weariness engendered of serious responsibility renders us skeptical of the outcome of all disease. Men have groaned over homœopathy; fifty years ago they despised Thompsonianism; they have sneered at spiritualism; they have distrusted

mesmerism and mental healing; they have looked askance at hypnotism, and have questioned the value of psychotherapeutics as applied by responsible scientists of to-day—grouping indiscriminately the good and the bad. Our thoughts have been divided and our intelligence assaulted by such a multitude of semi-quackeries and propositions of pseudo-science that often we are unable to winnow the grain from the chaff. Such is the diversity of modern-day conditions. More than ever, therefore, is it incumbent upon us laboriously and faithfully to seek for truth; not to assume it without proof; not to throw it aside without investigation; to recognize always the significance of good ethics, and to divorce captious etiquette from the painstaking pursuit of a genuine and enlightened knowledge.

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